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A
THIRD DISSERTATION

ON
F E V E R.

PART II.



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A
THIRD DISSERTATION

ON
F E V E R.

PART II.

CONTAINING AN
INQUIRY INTO THE EFFECTS

OF THE
REMEDIES,

WHICH HAVE BEEN EMPLOYED WITH A VIEW TO CARRY OFF

A

REGULAR CONTINUED FEVER,
WITHOUT LEAVING IT TO PURSUE ITS ORDINARY
COURSE.

Medicina igitur adhuc taliter comparata est, ut fuerit magis ostenta, quam elaborata; etiam magis elaborata quam amplificata.

BACON AUG. Sc. Lib. ii. Cap. i.

Solent autem homines naturam tanquam ex præalta turri et e longo despicere, et circa generalia nimium occupari; quando si descendere placuerit et ad particularia accedere, resque ipsas attentius et diligentius inspicere, magis vera et utilis secret comprehensio.—IBID.

By GEORGE FORDYCE, M.D. F.R.S.

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L O N D O N:

PRINTED FOR J. JOHNSON, IN ST. PAUL'S CHURCH-YARD.

1799.

42674

DR. FORDYCE'S LECTURES COMMENCE
THE FIRST MONDAY IN OCTOBER
AND FEBRUARY.

A

THIRD DISSERTATION, &c.

PART SECOND.

HAVING, in the first part of this dissertation, pointed out the history of a regular continued fever, the accidents that take place in it, and the manner of avoiding these accidents, if it should be left to pursue its ordinary course; excepting one accident, to wit, putrefaction, which arises but seldom; the author in the next place is to take into consideration the remedies by which the fever may be carried off, so as to leave the patient in health in a shorter time, or to conduct him through with less danger, than if the fever had been left to pursue its ordinary course.

B

Since,

Since, as has been already observed, the essence of fever, or the state in which the system in fever differs from the healthy state, is altogether unknown, the effects of medicines in removing that state can only be known by observation or experiment; there being no remedy that has any property, either chemical or mechanical, or any operation, when given to a man in health, that can point out any ground for employing it to carry off this disease.

The author now, therefore, comes to shew what remedies have been employed by practitioners to carry off regular continued fevers, whether they have been employed in consequence of some hypothesis, or have been found out by mere accident.

The first remedy to be considered is opening a vein in the arm, or indiscriminately in any other part of the body, and letting a quantity of blood flow out.

Authors and practitioners have confounded fever, such as the author has defined,
fined,

finer it, with many other diseases, particularly with all such diseases in which the pulse is frequent to a certain degree.

Many diseases, in which the pulse is frequent to a certain degree, differ from one another in almost every other respect. The pulse is frequent to upwards of an hundred strokes in a minute in a pleurisy; it is often frequent to above an hundred strokes in a minute in gangrene and mortification; but pleurisy, and gangrene, and mortification, are very different diseases, and require treatments totally different from each other. In pleurisy, taking away large quantities of blood is one of the most powerful remedies for carrying off the disease; in gangrene and mortification, taking away large quantities of blood would be the most effectual means of destroying the patient. In gangrene and mortification, the best mode of putting a stop to the disease, is to exhibit the bark of the cinchona, in large quantities, with wine and spices; in the pleurisy, exhibiting large quantities of the bark of cinchona with wine and spices would be

the surest way of increasing the pleurisy, and rendering it fatal.

Certainly, therefore, diseases in which the pulse is frequent may differ from each other in all things, excepting mere frequency of the pulse, which Dr. Boerhaave makes a specific mark of fever. It is to be observed, that he had not at the time he gave this definition ever seen a fever, having studied theology, and not medicine.

It has already been shewn that the pulse in fever is by no means always frequent, and that therefore frequency of the pulse can by no means be considered as a pathognomonic symptom of fever.

If all diseases, in which the pulse is frequent, be confounded together, and called fever, it certainly cannot be said that taking away blood never cures the disease; but if the disease, which the author has endeavoured to define as fever, be only meant, the taking blood from a large vein, in any part of the body indiscriminately, never diminished,

nished, shortened, nor carried off a fever in any case he has seen, nor has he found any upon record in which it had this effect.

It is true that an accident, such as general inflammation, may happen in an irregular fever, which may destroy the patient; which accident may be counteracted and prevented from doing mischief by taking blood from the arm, or any other part indiscriminately, as will be described when such irregularity is treated of. The accident being removed, the fever may afterwards continue its course, may terminate by a crisis, or wear itself out, just in the same manner as if no such accident had taken place.

The author having affirmed that taking away blood from the arm, or from any large vein, neither increases nor diminishes a fever, nor alters its course, as far as he has seen, he next comes to consider what might be expected from taking away a quantity of blood indiscriminately from any blood-vessel during a fever.

B 3

A quantity

A quantity of blood flowing out of the body, whether it be taken on purpose, or by any accident, occasions weakness. If the blood continues to flow, the weakness will encrease so as to render the body incapable of performing any function or action whatever, and in consequence to kill. If it does not continue to flow, it weakens a man, and the weakness continues until the blood is reproduced by the digestion of food of proper nourishment, or perhaps by the conversion of expressed oil, or other substances deposited in the body, into new blood. This weakness, with the accidents that arise from it, are the only effects of the loss of blood, which are perceivable.

As fever takes place equally in a strong and a weak man, it is also equally violent, as far as regards the fever itself, in a weak man as in a strong man, and it is apter, or at least as apt to run out to a great length in a weak man, as in a strong man.

It is not, therefore, *a priori*, at all probable, that weakening a man should diminish or shorten a fever.

It

It comes then to be enquired into, why taking away blood indiscriminately from any large vein has been so often practised in fevers, even by practitioners of the first rank in medicine?

The author can only refer this practice to the impatience with which mankind bear any evil, and that superstition which predominates in them. If any violent disease takes place, men immediately recur to some violent remedy. Their recurring through impatience to some very violent remedy is no proof, that such remedy is useful to give them relief from the malady. If a man who has gone upon a journey should return, and without previous notice find his house burnt down, his whole family and property destroyed, and all his friends ruined, he would be apt to stamp upon the ground, beat his breast and tear his hair; but stamping upon the ground would not rebuild his house, nor would beating his breast restore his family and property, nor tearing his hair retrieve his friends. It is mere impatience that makes

him have recourse to these violences, so mere impatience makes mankind have recourse to violent remedies in diseases, although no experience has shewn that they are of any use in the disease for which they have been employed. To this argument the author will have occasion to recur, when he comes to treat of irregular intermittents in a future dissertation.

So in like manner it is often from superstition that such violent remedies, and especially blood-letting, have been employed.

Mankind are exceedingly apt to believe, that refraining from some gratification is agreeable to the Almighty, or the gods their imaginations have created; even if they enjoy that gratification, without any injury to their own health or constitution, or without injury to their fellow creatures, or any animal whatever, or without hurt to their moral character.

Some pretended teachers of religion have even gone so far as to refuse to their disciples,

ples, dying of so distressing a disease as pulmonary consumption, the gratification of enjoying the cheerful warmth of the sunshine.

Under this, or some very similar idea, men have thought that their gods would be content with one part of the body to save the whole. Hence we see among many rude nations, that a finger or toe is cut off, or a tooth or two knocked out, in order that the rest of the body may be left safe.

Blood, by its intense red colour, has attracted the attention of mankind. It has also attracted their attention because the loss of it, as has already been said, in a certain quantity, is fatal; the losing, therefore, a quantity of blood, has become the object of their superstition. Losing blood has been looked upon as the greatest oblation that could be made in the most solemn ceremonies; as the mark of the greatest bond of secrecy and steadiness, men have signed contracts with their blood. Taking away, therefore, a quantity of blood has
been

been thought a sacrifice the most powerful for carrying off a disease, and for carrying off fever as one of the most violent and fatal of diseases.

The author does not mean to say that every practitioner, who bleeds constantly at the beginning of a regular continued fever, has this idea in his mind. The greatest number of practitioners follow the practice of those who went before them, without examining from whence that practice has arisen, or upon what ground it is founded.

From this view of the subject it may, perhaps appear why blood-letting has come into practice in the beginning of all regular continued fevers.

Practitioners also have not compared cases of fevers in which it has been practised, and of fevers treated otherwise in the same manner in which it has not been practised.

The author has said, that taking away a quantity of blood from any large vein indiscriminately,

discriminately, in any part of the body, neither increases, diminishes, nor shortens a regular continued fever. The next enquiry is, whether any mischief may arise in a regular continued fever from taking away a quantity of blood.

The author has already shewn that a patient afflicted with regular continued fever cannot digest his ordinary quantity of food; therefore the fluids which are constantly wasting cannot be recruited, and that the system must be weakened.

That in a regular continued fever there are constant exertions which likewise debilitate.

That the rest which takes place in sleep is necessary to restore the living power, but sleep being prevented in fever it is not recruited.

That in consequence of all these causes of weakness, the patient is actually so debilitated as to be destroyed in many instances.

stances. The further debility arising from emptying the vessels by taking away a quantity of blood, is often such as to destroy the patient in the remaining part of the disease. Patients in consequence have very often been cut off, when blood has been taken indiscriminately from any large vein at the beginning of the disease, as the author has seen in a great many cases. In the first part of the author's practice, the Boerhaavian doctrine prevailed; this induced practitioners to take blood from the patient in all cases of fever, so that the author has had occasion frequently to see the effects of this practice.

The author having said that the essence of the disease not being at all known, it cannot be said, *a priori*, whether any particular remedy will be of use in shortening or entirely carrying off fever;

Taking away blood from the vessels of the head has, in some cases, immediately carried off fever; it has also tended to diminish delirium accompanied with fulness
of

of the vessels of the head, even when it does not shorten the disease.

The first of these effects will be considered in a dissertation on the irregularities of fever, and the second in a future part of this dissertation.

Many practitioners have supposed that fever arises from some peculiar kind of matter that has got into the body; that fever is an effort produced in the body to induce some operation by which such matter might be destroyed. Sydenham judiciously supposes, that a fermentation takes place which alters the qualities of the matter, or converts it into another species of matter which has not the property of producing or keeping up this disease.

If it were really true that any particular species of matter produced and kept up a fever, it would follow that until such matter was destroyed by a fermentation, or some other process that might take place in the body, or was evacuated, the fever would
continue.

continue. In that case, it would become a question whether some other means than that which takes place in the body of itself, might be employed to take this matter out of the body, or destroy it, so that it might no longer keep up the disease.

Some practitioners have supposed that this might be done by evacuation.

If a blood-vessel is opened, the whole circulating fluids are equally evacuated, every one, good or bad, noxious or innoxious, those that are commonly in the body, and those that are there only by accident; no particular matter would be taken out more than another, and therefore it is not to be supposed that the matter occasioning a fever would be removed by making this evacuation.

If the substances evacuated out of the body by the various excretions be examined slightly, they appear to be more different than when they are examined more minutely, but still upon minute examination they differ very much.

It

It might happen that some secretory organ is disposed to throw some particular noxious matter out of the system, and that therefore, by increasing some secretion, (since an encrease of any secretion, to a certain degree, occasions the secreted matter to be thrown out of the body) might make the matter producing and keeping up fever be evacuated, so that the fever should cease. But it may also happen on the other hand, as has already been taken notice of, that a fever may arise without any noxious matter being applied to any part of the body, or generated in the body; and in this case there being no noxious matter to evacuate, neither the operation of purgatives; or any other evacuant would carry off the matter, and so remove the disease.

It has also been shewn that noxious matter does sometimes produce fever when applied to the body, and that after the fever is produced, it is really contained in the body, as in the case of fever arising from the application of variolous matter; but then it has been shewn, that in such cases the noxious
matter

matter produces the disease at once, and what is contained in the system after the fever had taken place, has no effect upon the disease ; it neither increases it, nor does its absence diminish it, and the fever often goes off when there is the largest quantity of noxious matter in the body. In such cases it would not surely be conceived, if we could evacuate such matter, that the disease would be carried off ; in such cases, therefore purgatives would be of no use.

Hitherto the argument has been pursued *a priori* ; but neither the essence of fever, nor the operations of the human body, are sufficiently known, as the author has before observed, to determine the efficacy of any medicine to carry off fever ; experience must therefore be had recourse to, to determine whether purgatives or any other medicine producing evacuation from any gland may be employed to carry off the disease.

If the matter be referred to the experience of the most judicious authors, all those who have conceived fever to depend upon
matter

matter of a peculiar kind contained in the system, have agreed that it must be concocted before it can be evacuated ; that is, that it must undergo some process before it is prepared for evacuation ; otherwise that evacuation, by purging, or increased secretion from any of the glands, will have no effect in carrying off the disease. They are agreed at least that evacuation before concoction must only be made at the beginning of the disease to be efficacious ; after the disease has continued a day or two, they have no more expectation that evacuating the matter will carry off the disease. The author, therefore, would be warranted by authority to say, that evacuation by purging, or any other increased secretion from glands, would have no power of carrying off fever, excepting the evacuant should be employed in the first twenty-four hours ; or at the end of the disease, after the matter is concocted, or has undergone such an alteration as to render it fit for evacuation.

It is further to be observed, that when any matter is applied to the body, so

as to produce fever, not immediately, but at the interval of several days, such as the matter of the small pox, or the measles, or putrid or infectious vapour; if purgatives are employed during the interval between the application of such matter, and the taking place of the first paroxysm of fever, the fever has never been prevented from taking place in any case which the author has seen; or in any case which has been recorded with almost any evidence. This is equally to be observed in those cases in which the application of the cause has produced some immediate appearance of the first stage of fever without producing a perfect paroxysm; when these appearances have continued until a complete paroxysm has taken place.

In those cases where the application of the matter to the body, which occasioned the fever, produced no appearance of the disease on its application, but the patient felt himself in perfect health until the complete attack of the fever came on, neither purgatives nor any other medicine increasing secretion, have prevented the disease.

If

If the evacuation by purging or increased secretion from any of the glands, does not carry off the matter from the body before it has produced the disease, there seems to be little reason to hope that such evacuation will carry off the matter occasioning the fever, and the fever itself after it has actually taken place.

The author has already observed, that feculent matters remaining in the intestines, which they are apt to do when a fever takes place, tend to increase the disease. Though their removal prevents the mischief they would produce, yet, as far as the author has been enabled to judge from the attention he has paid to such cases, their evacuation has in no case done more than merely obviate the mischief which would have taken place in consequence of their retention. Such evacuation has never, in any degree, removed the fever, or prevented it from pursuing its ordinary course.

Those practitioners who have believed that fever depends upon some noxious mat-

ter contained in the body ; that that noxious matter is concocted ; that is, goes through some operation by which it is prepared for evacuation, have also supposed that when a crisis took place, the matter was evacuated after it is concocted, and that so the fever was carried off. They have thought that if it was not completely evacuated, it is necessary to employ purgatives to evacuate what might remain of the matter in the body, and re-produce the disease. They have also thought that when no marked crisis took place in the disease, but it gradually subsided, that it subsided more slowly on account of the noxious matter not being all at once evacuated, and therefore have employed purgatives to make it be evacuated more speedily, so that the disease should sooner subside.

The author, from his own practice, is obliged to be of a contrary opinion, since he has seen relapses much more frequently take place when purgatives have been employed after a marked crisis, or after the disease has gradually subsided, than when purgatives have not been employed.

Upon

Upon the whole, then, the author believes it to be perfectly necessary at all times, during the progress of a regular continued fever, to keep the intestinal canal free of feculent matter; yet that making further evacuation by purging or increasing the secretion from any of the glands, so as to occasion evacuation, is of no use in carrying off the fever, but rather tends to prevent the fever from being carried off, and, if it is carried off, to produce relapses.

Moreover the author has already shewn, that it required the whole force of the system to support the patient through the ordinary course of a regular continued fever. He has also shewn that the force of the system is reduced by evacuation; he must therefore conclude, that simple evacuation by purging, excepting in as far as it is necessary to keep the *primæ viæ* clear of feculent matter, is detrimental instead of being useful; and that simple evacuation from any of the glands, as tending also to weaken, is detrimental instead of being useful.

It does not appear with any degree of certainty that antimony, a medicine which has been employed to carry off fever within this century or two, was at all known to the Greek philosophers, physicians, or artists.

There was a substance which they named stibium, which was employed to give a blackness to the eyes, but the effects which were produced from it either among the Greeks and Romans, or among the modern inhabitants of Asia, shew that this substance was more probably a kind of lead ore than an ore of antimony.

Antimony, or as it is more commonly called crude antimony, is the ore of a metal which exists in many parts of the earth. It is a compound of sulphur and a metal, in which the sulphur bears a much greater proportion to the metal than can be combined with it chemically. More properly, it is a compound of sulphur and the metal, diffused through a superfluous quantity of sulphur, so that part of the sulphur retains
some

some of its properties, which it has when not combined with the metal. The sulphur so covers the metal or is so combined with it, as to prevent it from producing its medicinal effects. This ore of the metal is solid in the heat of the atmosphere. It requires a little less than that degree of heat which renders substances luminous to melt it, somewhere probably between five and six hundred degrees of Fahrenheit's thermometer. Its melting point has not been exactly ascertained in as far as the author knows. It is of a dark blue colour, and is generally found in a kind of crystallization, sometimes in complete crystals, which are prisms terminated by pyramids at one end, and at the other generally attached to each other; otherwise is a mass without form. More commonly these crystals are united together so as to form a striated mass, especially when they are unmixed with any other substance.

The metal has lately been found also combined with some substance, so as to

form the same kind of crystals or striated mass, only of a dark red colour, shining, however, with metallic lustre. It has been conjectured, rather than confirmed by experiment, that these crystals or this striated ore contain arsenic, besides sulphur and the metal of antimony. This conjecture is rendered probable, because this red ore of antimony has been almost always found with regulus of arsenic; that is, the metal of arsenic pure; and therefore experiments made to verify the existence of arsenic in this red ore, should be made in such parts of it as are perfectly clear from the particles of the metal of the arsenic in which it is found.

The metal has also been found but very rarely, certainly however sometimes uncombined with any other substance, but so rarely hitherto as not to be employed for any medicinal purpose.

Upon the whole, all the antimony which has been employed in medicine has been
procured

procured from that ore of antimony, consisting of antimony and sulphur.

This ore, when dug from the mine, is laid upon an inclined plane, formed from a mixture of clay and sand burnt in the fire. The inclined plane is heated red hot; the ore of the antimony being laid upon it melts, and runs off from the other substances with which it is mixed, and is received into a large and deep earthen vessel, in which, when it has stood to cool, it concretes into a solid mass.

If this solid mass concretes so as when broken to exhibit long striated shining spiculæ, it is a pure compound of antimony and sulphur, and fit to be employed for medicinal purposes.

A vast number of chemical processes have been employed to give antimony medicinal effects; more than two or three thousand. Of the product of all these there are only three preparations at present much in use.

One

One is made by boiling the antimonial ore or crude antimony in a solution of pure or prepared kali in water. The decoction, after it has been strained, is diluted with a considerable quantity of water, at least ten times its weight. The diluted solution is placed in a shallow vessel, the surface exposed to the air, until a powder falls to the bottom of the vessel, which, taken out and dried, is called kermes mineral.

The second process is performed by mixing the ore of antimony or crude antimony, finely powdered, with an equal weight of the shavings of the horn of any animal. This mixture is to be put into an iron pot, which is to be heated red hot, and the mixture is to be stirred, the pot being kept red hot, until it ceases to smoke. The mixture is afterwards to be allowed to stand until it cools. It is then to be put into a crucible, which is to be covered with another crucible, whose mouth is to be turned down into that crucible which contains the materials. The crucibles with the materials are exposed to a white heat for two hours; part of the mat-
ter

ter remains of a white colour in the under crucible, which is to be used; part sublimes into the upper crucible, which is to be thrown away.

The third preparation is made by combining the metal of antimony with tartar, an acid produced in the fermentation of various wines, which is found adhering to the sides of the vessels in which the wine has stood for a year or more after the active fermentation has ceased.

When two substances, which unite with one another only in one proportion, are combined together chemically, and the compound purified, the substance is undoubtedly the same in all its properties. It happens, nevertheless, with respect to the chemical combination of two substances which unite with each other in one proportion only, that when they are combined together by different processes, there are often different imperfections in the combination or some want of purity in the compound. This, though not sensible to any chemical test,

test, makes a very considerable difference in their actions as medicines. In the present instance of the compound of tartar and the metal of antimony, or, perhaps, if strict adherence was to be had to chemical accuracy, we should say compound of tartar and calx of antimony, this difference is conspicuous. Of the several methods of forming this compound, the following is the best for medicinal purposes: Take an equal weight of the ore of antimony separated from extraneous substances by fusion, as has been above described, and of kali nitratum. Powder them together, and throw the mixture into a crucible, heated so as to be just luminous, by very small portions, about twenty grains at a time, until a deflagration takes place; wait till the deflagration is over; throw in a little more of the mixture; wait again till the deflagration is over. Proceed in this manner until the whole is deflagrated. Cover the crucible, and expose it to an heat just sufficient to melt the whole mass. Pour the melted mass into an iron vessel of a conical form, the point of the cone being downwards; the whole

whole will be found, when it is cold and solid, divided into two substances, one of a reddish brown colour and heavier, which has fallen to the bottom; the other, of a grey colour, which is found at the top, and is specifically lighter. The heavier part, which is found at the bottom, is a compound of sulphur and the metallic part of the antimony. A portion of the sulphur which was united with the antimony in its ore, more than was necessary to combine with the metal of the antimony, is converted into vitriolic acid by uniting with the air of the nitrous acid. This vitriolic acid is found in the upper greyish mass, combined with the kali of the kali nitratum, and forms kali vitriolatum.

The antimonium sulphuratum, found at the bottom, is to be powdered and mixed with one third more than its weight of purified tartar, and boiled in six times its weight of water for a quarter of an hour; the solution is to be filtrated and the water evaporated, and the compound of the tartar and the metal of the antimony crystallized.

This

This salt for chemical purposes may be purified, by dissolving it again in water and re-crystallizing it ; but it is a question whether it would not lose some portion of its medical powers by this purification.

The metal of the antimony may be separated from the sulphur with which it is found combined in its ore, by mixing the ore with five times its weight of kali preparatum ; that is, with kali combined with gas, which gas has been called also fixed air and carbonic acid. The mixture of the kali preparatum and ore of the antimony is to be melted together by a heat just sufficient to render them perfectly fluid. The crucible being taken from the fire is to be left till it is quite cold ; on breaking it, the metal of the antimony will be found at the bottom, and the compound of kali and sulphur at the top.

This is not the most economical mode of obtaining the metal of antimony ; but provided we take the ore separated from the other substances with which it is found
mixed

mixed in the mine, as has above been described, the metal by this process is obtained the purest for medicinal purposes.

If the metal thus obtained is powdered finely, and boiled with pure tartar in water, a compound of the tartar and antimony will be obtained, which, if purified by re-crystallization, will be exactly the same with that obtained by the process above described, in all its chemical properties.

Another mode of obtaining this compound is—Take the ore of antimony purified, as has been already described, powder it, and put the powder into a flat vessel; heat it till it begins to smoke; keep up the heat, but take care not to render it so great as to melt the mass, until it no longer smokes in any heat not sufficient to melt it. The remaining mass, which is the metal of antimony calcined (probably combined with pure air) if exposed to a greater degree of heat, will melt into a glass. If this glass be powdered, and boiled with pure tartar in water, a compound of antimony and tartar will also be procured; this purified by re-
peated

peated solutions in water and crystallization will, in all its chemical properties, be the same as when the salt is procured by the two processes already described, but if not crystallized a second time, will not agree exactly in its medicinal effects.

The metal of antimony may be combined with muriatic acid, by several processes. One of these, for instance, is. Mix the ore of antimony with that compound of muriatic acid and mercury which has been called corrosive sublimate. Perform a distillation, or rather a sublimation, and expose the matter sublimed to the air of the atmosphere, until it has attracted water enough to render it fluid; pour this solution of antimonium muriatum in water, or any other made by this or any other process in which the water is saturated with the antimonium muriatum, into eight or ten times its weight of distilled water. A calx of antimony will fall down in a white powder, which has been called powder of algarath; this being boiled with pure tartar in water will combine with it, and form antimonium tartarifatam, which,

which, if purified by re-crystallization, will be the same to all chemical and medical purposes as the antimonium tartarifatum produced by the three foregoing processes, but not exactly in its medical effects unless purified by recrystallization.

Although the antimonium tartarifatum obtained by any of these processes, when purified by re-dissolution in water and re-crystallization, may perhaps be the same for medicinal as well as chemical purposes, which however has not been proved by experiment, yet when it has only simply been formed by these four different processes, without re-dissolution in water and re-crystallization, there is a difference in its operations as a medicine.

When the London College of Physicians reviewed their pharmacopeia for its reformation and republication in the year 1786, it became a question which of the four processes they should adopt.

Whenever any question of a chemical or pharmaceutical kind occurred, it

D

was

was referred to a committee consisting of some members of the College and the Company of Apothecaries, and the processes were actually performed in the laboratory of the Company of Apothecaries, that so the best mode of performing the operation might be verified by experiment.

A question having arisen with regard to tartarised antimony, it was prepared by all these processes.

The tartarised antimony produced by these processes was given to the Physicians of St. Bartholomew's and St. Thomas's Hospitals. In St. Thomas's Hospital they were given to more than an hundred patients, so as to give each of them to one and the same patient in small doses.

The tartarised antimony prepared with the crocus metallorum and tartar was found to be capable of being exhibited in a larger dose than any of the others without producing sickness, and to act more powerfully as a sudorific, and therefore was preferred, whether

ther properly or not, will be argued afterwards.

At the time the science of medicine was revived with the other sciences first in Italy, there does not seem to have been any medicine recommended to put an end to fever immediately by Galen or Celsus, or any of the Greek or Roman writers upon the subject, excepting cold water drunk in a large quantities at once. It was not supposed that a fever might otherwise be cured immediately so as to prevent any future appearance of the disease, either by preventing the returns of the paroxysms, or carrying off the disease instantaneously, or by producing an immediate crisis. The doctrine then was to attend to the disease while it pursued its ordinary course, only taking care of the accidents which might happen during that course, that is, taking fever according to that idea of it which the author has been endeavouring to lay down.

There arose in Europe some time afterwards a number of alchemists who made

many processes with a view to convert metals into gold. Having formed many substances by processes which did not make gold, but which produced many things which they were not able to turn to any profit, they tried to apply them to the cure of diseases. All such chemists must be considered as empiricks, and the greater part of the substances which they produced were in fact of no use. Antimony, however, gained a reputation for carrying off some diseases without their going through their ordinary course if otherwise left to themselves; it is probable it was employed for this purpose in fever as soon as the time of Van Helmont.

These chemists did not study medicine, nor did they distinguish diseases, but only aimed at making some profit of the result of their processes. They called every disease fever in which there was great sense of heat in the patient, and greater frequency of the pulse than in health, so that they not only employed preparations of antimony in fever, but in internal inflammations and various other diseases.

Practitioners,

Practitioners, who were educated in the regular practice of medicine, studied principally the writings of the ancient Greek and Roman Physicians. These used for the most part vegetable substances for remedies in diseases; the modern practitioners, therefore, reprobated all the substances which were the result of chemical operations; they considered them only as the boast of ignorant empiricks. This opinion went so far, that even so late as the time of Boerhaave, mercury was rejected by regular practitioners in the venereal disease.

Some practitioners, as there always will be men who balance between two different doctrines, employed indeed preparations of antimony, but such as had little or no effect; such as antimony calcined, by deflagrating it with three times its weight of nitre, and various others equally inefficacious. They of course did not find any advantage arise from preparations of antimony; they therefore reprobated the use of all antimonial medicines in fever. Hence it happened that they were not much employed before the time of the late Dr. James with efficacy

in Great Britain : he was a Physician of regular education, having studied at the University of Cambridge, but was considered in some degree as an empiric in consequence of employing some preparation of antimony, which he kept a secret.

The preparation he made use of consisted principally of antimony calcined, by mixing it with shavings of harts-horn, and exposing the whole to a great degree of heat. Upon analysing it, which was done long before his death, it was found to consist of a calx of antimony, mixed with bone ashes. It is extremely probable, that he mixed along with it a proportion of tartarised antimony ; the author knows that he purchased considerable quantities of tartarised antimony, two pounds at a time, from an eminent druggist. This might easily escape the scrutiny of a chemical analysis, since the quantity contained in one dose did not certainly exceed a quarter of a grain. From the very easy decomposition of tartarised antimony, when dissolved in a large proportion of water, so small a quantity might not be observed,

Dr.

Dr. Cullen was the first eminent teacher of medicine who recommended the use of preparations of antimony to carry off fevers directly. As most of the principal practitioners of the present day, in this island of Great Britain, have been pupils of Dr. Cullen, its use has lately very much prevailed. If this had not been the case, it would have been a question whether it would not have sunk into oblivion, like any other empiric remedy whose preparation was kept secret.

Dr. Cullen conceived, that the effect of preparations of antimony arose from their producing sickness. Tartarised antimony is much more certain of producing sickness, than any other preparation that was known to him; it was therefore preferred by him, and of course that preparation of antimony which produced sickness in the smallest dose he considered as best.

The author is of a different opinion; to wit, that it is not the sickness produced by the preparations of antimony, that has the

effect of carrying off fever immediately, but some other operation of the medicine.

First, because there are many other remedies which produce sickness to as great a degree as any preparation of antimony; yet these have no power whatever of making fever terminate sooner than it would if it was left to pursue its own course. The root of the squill, for instance, often produces sickness to a much more severe degree than any preparation of antimony, yet it has never been alleged, that it has the power of carrying off fever sooner than it would go off, supposing that it was allowed to pursue its ordinary progress. Moreover, the author has frequently exhibited the root of the squill as an emetic, and likewise in such doses as to produce nausea without vomiting; also in such doses as just not to produce nausea, without ever producing any thing similar to the appearances which take place in a crisis of fever, or without ever once occasioning a fever to terminate sooner than it would have done if left to pursue its own course. In so far, therefore, the author must conclude, that the sickness occasioned

caused by the exhibition of a preparation of antimony is not the cause of its carrying off fever.

Secondly, the stomachs of different men, though they are otherwise in the same situation, are affected differently by the same quantity of any particular medicine: the stomach of different persons, or of the same person at a different time, being able to bear a larger dose without its producing sickness or vomiting.

Almost every medicine given in a certain dose will produce sickness and vomiting; even opium, if given in a certain dose, that is, to the quantity of two or three grains, will sometimes produce sickness and vomiting, and sometimes purging.

When a medicine is given in such a dose as to produce vomiting, it often loses its peculiar effect. The bark of the cinchona, when given in such a dose as to produce vomiting, either from the disposition of the stomach of the patient not to bear so large a quantity as the stomachs of men will generally bear, or from its being exhibited in a
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larger dose than common, will often fail in putting a stop to the progress of an intermittent fever. It may be said indeed, first, that the peruvian bark, by producing sickness and vomiting, will be thrown out of the stomach before it has time to be absorbed and carried into the blood-vessels. But the author has shewn in his Dissertation on a regular tertian, that it does not put a stop to the progress of an intermittent fever by being carried into the intestines and absorbed, but by the impression it makes on the stomach and intestines. In the second place, it may be said that the bark of the cinchona, by producing vomiting, is prevented from remaining a sufficient time in the stomach to make its impression there; but the author has also shewn in the same Dissertation, that the bark of the cinchona exhibited half an hour before the beginning of a paroxysm of a tertian intermittent, often makes sufficient impression to prevent the paroxysm from taking place. It is often more than half an hour after the exhibition of a dose of the bark of the cinchona before it occasions vomiting; but when it does occasion vomit-

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ing, it often does not prevent the return of the disease.

In like manner, *cerussa acetata* given in a small dose does not produce either vomiting or purging, but on the contrary a diminution of the peristaltic motion of the intestines, and not uncommonly a paralytic affection of them, and likewise of the extremities; yet when it has been by accident taken in a considerable dose, to the quantity of a dram or two, as the author has seen in several cases happen, it has produced both vomiting and purging, but no paralytic affection of the intestines, or any other part of the body, has ensued.

The author therefore conceives, that when any remedy produces vomiting, it very often loses by this effect its other operations on the system, and that preparations of antimony, in like manner, if they produce vomiting, or even sickness, though no vomiting should ensue, lose their effect in carrying off fever.

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The author conceives, that every medicine given in too great a dose acts as a simple stimulant on the part to which it is applied, and loses its peculiar effects both on that part, and on the system generally. Thus a moderate quantity of wine makes the stomach digest the food more readily than it otherwise would have done, but a large quantity of wine prevents digestion from taking place at all. A moderate quantity of spice gives a feel of warmth over the whole system, a large quantity of the same spice produces pain in the stomach and coldness over the whole system, and frequently sickness and vomiting. It would be too great a digression to enter fully on the maximum of the doses of medicine; if the author should live to finish these Dissertations, it is a subject that he means to pursue.

In the third place, the author has observed, when tartarised antimony has been exhibited in fevers, that when the patient's stomach could not bear a quarter of a grain of it prepared as has been said, without producing sickness, it has happened rarely
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that it has produced any thing like a crisis, or in any way diminished or carried off the disease. On the contrary, when the stomach would bear more than a quarter of a grain of tartarised antimony, prepared in the same way, and by the very same individual process, without producing any nausea, it has very often produced critical symptoms, or a complete crisis, so as to carry off the disease. For these reasons, the author differs in opinion from Dr. Cullen, and believes it is not the sickness that has the power of producing a crisis, or any appearance of crisis in a regular continued fever.

It appears then, first, that several medicines, producing as great a degree of sickness as preparations of antimony, have no power whatever of carrying off fever, by producing crisis, or appearances similar to crisis, or in any other way.

Secondly, that producing sickness prevents medicines generally from operating in their own appropriate manner.

Thirdly,

Thirdly, that preparations of antimony, when they produce sickness in small doses, are not so efficacious in carrying off fever, as when it requires a larger dose of them to produce nausea, and also that they are more efficacious when no nausea is produced; and therefore, upon the whole, that it is not the nausea produced by preparations of antimony, that renders them efficacious in producing symptoms similar to those that take place in the crisis of a fever, and so carry off the disease. On the contrary, that any preparation which can be made to act with certainty in a larger dose, without producing nausea, is preferable for carrying off fever. Further, that tartarised antimony, prepared by boiling crocus metallorum with tartar in water, and not purified by a repeated solution and crystallization, is the best manner of preparing the compound of tartar and antimony for this purpose.

The next question is, whether tartarised antimony prepared, as has been described, or regulus of antimony mechanically mixed with sulphur, as in that preparation which has been called kermes mineral or the calx of antimony,

antimony, mixed with calx phosphorata, which formed at least a principal part of Dr. James's powder, and is the pulvis antimonalis of the last edition of the London Pharmacopeia, are the preferable preparations of antimony for immediately producing symptoms similar to those that take place in the crisis of fevers.

The regulus of antimony in the kermes mineral, the calx of antimony in the pulvis antimonalis, are neither of them soluble in water. It has been held by many practitioners, that substances not soluble in water, must be combined with some menstruum in the stomach with which they form compounds soluble in water to be efficacious. If this be the case, these preparations of antimony, to wit, kermes mineral and pulvis antimonalis, will be subject to an uncertainty in their operation, by their meeting with or not meeting with a menstruum with which they may combine so as to form a compound soluble in water.

The first thing then to be enquired into is, whether it be true, that if any solid substance,

stance, insoluble in water, be thrown into the stomach, it will act upon the stomach and intestines, or system generally, without finding a menstruum with which it will combine so as to form a compound soluble in water.

It is well known, that sulphur thrown into the stomach in fine powder, as it is when precipitated from an alkali by means of an acid, or in fine crystals, as when it has been recently sublimed, will act as a purgative.

In either of these cases, if the sulphur be perfectly pure and unmixed with any extraneous matter whatever, it is not soluble in water in the smallest degree. It is true, that if sulphur be thrown into water, and left in the water with the surface of the water exposed to the atmosphere for some length of time, the sulphur will combine either with the air of the atmosphere or of the water, and form vitriolic acid, which is soluble in water. Sulphur recently precipitated from an alkali by means of an acid, or recently sublimed, has not acquir-

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ed any air, it acts however equally as a purgative. Moreover, vitriolic acid rarely acts as a purgative in any dose given uncombined with any other substance, whereas sulphur rarely fails of acting as a purgative.

It is therefore to be considered, whether sulphur meets with any substance in the stomach with which it will combine, so as to form a compound soluble in water.

In the first place, it meets with water in the stomach with which, it has been already said, it will not combine, nor will it be altered, excepting by long digestion, in the heat of the human body. If it should alter by combining with the pure air of the water, the acid thus formed rarely acts as a purgative; nor does inflammable air, the other element of the water, act as a purgative. It is therefore extremely improbable that it should act as a purgative, by decomposing the watery fluid that it meets with in the stomach.

The water found in the stomach is im-
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pregnated

pregnated with animal mucilages, such as the solid matter of the mucus; but water, impregnated with animal mucilages, is not decomposed more readily by sulphur being applied to it, nor does it more readily combine with sulphur in consequence of its being already combined with such animal mucilage. The gastric juice, as it is called, in counter-distinction to other fluids found in the stomach, has been thought by some to be a powerful menstruum, and to unite with the food, so as to form chyle or some compound preparatory to the formation of chyle. This solvent power of the gastric juice the author has argued in his Treatise on Digestion, the result of which argument appears to be, that it has no such solvent power; on the contrary, it appears that its sole power is to coagulate certain animal and vegetable substances, so that they may be retained in the stomach until they go through that part of the process of digestion which is necessary in the stomach. No experiments have been made to shew whether or not this gastric juice will combine with sulphur, so as to form with it a compound soluble in water. It is extremely improbable

improbable that it does, since water, combined with other mucilaginous matters, does not dissolve sulphur more readily than pure water. Gastric juice renders certain substances insoluble in water, that are otherwise capable of being combined with it; it is therefore improbable, that gastric juice should combine with sulphur so as to form a compound with it soluble in water.

In the juices of the stomach, there is sea salt, that is, natron muriatum; ammonia muriata, and ammonia phosphorata, and sometimes, perhaps, calx muriata, as there are in all the other juices of the body, but none of these salts combine with sulphur so as to form a compound soluble in water.

Other substances are found in the stomach sometimes, but not always; but sulphur almost always proves purgative, and therefore does not act on the stomach and intestines, in consequence of meeting with a substance in the stomach which is accidentally found there.

Sulphur, therefore, does not act as a purgative in consequence of any thing it meets in the stomach with which it forms a compound soluble in water.

Sulphur, when it gets into the duodenum, meets with bile which might combine with it, and form a compound soluble in water. The like might happen with pancreatic juice, with which it often meets in the duodenum. From the author's experiments, which it would be too great a digression to relate here, sulphur is neither capable of combining with bile nor pancreatic juice, and therefore sulphur does not act by combining with bile or pancreatic juice so as to form a compound soluble in water.

The same observations may be made with regard to the other fluids it meets with in the intestinal canal; it is at least extremely probable, that it does not combine with any of them so as to form a fluid capable of being combined with water.

Sulphur

Sulphur is capable of being combined with that vapour which Vanhelmont first took notice of, and called gas, but which has since been called fixed air, and by many other names. This vapour is found sometimes in the intestinal canal. It is also capable of being combined with inflammable air. Neither of these vapours is found generally in the intestines, whereas sulphur acts almost always as a purgative.

We must therefore conclude that sulphur acts upon the stomach and intestines in a solid form. It is also capable of acting on them independently of any mechanical effect; a solid is therefore capable of acting on the stomach and intestines medicinally.

Regulus of antimony, and the calx of antimony made by mixing antimony with shavings of hart's-horn, burning them together, and exposing them to a great degree of heat, may act upon the stomach without being combined with any substance, so that the compound is soluble in water, and

therefore may act independently of any menstruum they may meet with in the stomach.

It has been often affirmed in medicine, that whatever was shewn to be possible, was also true. This is a proposition totally repugnant to all the laws of evidence; it does not follow, therefore, that although one solid in powder may act upon the stomach and intestines, every solid does. The next question then that comes to be discussed is, whether the fine powder of the regulus of antimony in kermes mineral, and the calx in the pulvis antimonialis, do act in a solid form without being combined with some substance with which they form a compound soluble in water.

In the healthy state of the body, the fine powder of the regulus of antimony in kermes mineral, and the calx of antimony in the pulvis antimonialis, being thrown into the stomach, will frequently act as an emetic.

In the healthy state of the body, there is no acid in the stomach not combined with
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an alkali, therefore neither of those preparations of antimony can act in consequence of being dissolved by an acid in the stomach, unless they should decompose the neutral salts. Whether they can decompose the neutral salts, to wit, sea salt, common sal-ammoniac, or phosphoric ammoniac, as they are applied in the stomach, or whether they are soluble in the neutral salts themselves, is not known, and therefore the argument must be taken on another ground.

If tartarised antimony, prepared as has been described, be exhibited to a man in health, it hardly ever happens that a third part of a grain can be taken without producing sickness and vomiting, or purging. It very rarely produces any nausea, if taken in the quantity of a fifth part of a grain, by an adult. On the other hand, the pulvis antimonialis, or kermes mineral, will sometimes produce sickness and vomiting, taken in the quantity of three grains; on the other hand, they may be taken very often to the quantity of eight or ten grains, without producing any sensible effect. The

author has seen them often employed to the quantity of twelve or fifteen grains, without having any apparent effect at all.

Moreover, kermes mineral, and the pulvis antimonialis, the author has seen, in several instances, exhibited at the interval of six hours, for four and twenty hours, or forty-eight hours, without producing any sensible effect, and at last, all at once, they have brought on a severe vomiting and purging, so as to weaken the patient very much.

It must, therefore, be concluded, that either they are not active in a solid form, unless combined with some menstruum that will form with them a compound soluble in water, or otherwise that acting in a solid form, they are very uncertain in their operation. In either case, tartarised antimony is a preferable preparation to kermes mineral, or the pulvis antimonialis, or Dr. James's powder, which partakes of all the uncertainty of the pulvis antimonialis.

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The author does not by any means say that tartarified antimony, prepared as has been described, is the best possible preparation of antimony. On the contrary, he thinks that if a preparation was to be found out, of which the stomach would bear a much larger dose without sickness, and act with the same certainty, it would be preferable to tartarified antimony, prepared as has been described.

Another circumstance must be remarked. If tartarified antimony be dissolved in a large proportion of water, it, like all other metallic compounds with acids which are soluble in water, will be decomposed, if the solution stands with a surface exposed to the vapours which constitute the atmosphere. It will be less apt to be decomposed, if it be dissolved in recently distilled water, than in river, spring, or rain water. It will be still less apt to be decomposed if combined with wine, and especially a sweet and strong wine; it is, therefore, much better to keep it dissolved in wine. The solution is convenient when the wine contains a quarter
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of a grain of tartarified antimony, in half a dram by measure of the wine, as in the *vinum antimonii tartarifati* of the London Dispensatory. Of this solution, half a drachm by measure may be exhibited, or any greater or less quantity, mixed at the time of exhibition with an ounce of any watery vehicle, before it has time to decompose.

The other preparations of antimony, excepting those which have been enumerated, which are hitherto known, are so uncertain in their operations, as to make them totally unfit to be employed in fever.

It is an undoubted fact however, that other preparations of antimony than the three enumerated, have been exhibited to a patient ill of a fever, and have occasioned appearances similar to those which take place in the crises, which happen during the progress of regular continued fevers left to pursue their ordinary course. Such crisis has terminated the fever in the manner in which it is terminated by an ordinary crisis, so that the patient
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has been freed from the fever in a few hours, it has not afterwards recurred ; but they act so uncertainly, that it is not worth while employing them.

Preparations of antimony, when exhibited to a man in perfect health in such a dose as just not to produce sickness, occasion, after two or three hours, a breathing sweat, and softness of the skin, not unfrequently a lateritious sediment in the urine, open the body, and produce afterwards an universal tranquillity over the whole system. They occasion therefore appearances similar, as much as can be, to those which take place in the crisis of fever.

It is attested by many authors, that on the exhibition of Dr. James's powder, the pulvis antimonialis, kermes mineral, and tartarised antimony, in two or three hours afterwards, or from that to five or six hours, the symptom which ordinarily arise in the crisis of fever have taken place, and that the fever has been carried off in less than
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twenty-four hours, so that the patient has perfectly recovered.

The author has seen each of these preparations of antimony exhibited in a fever during the ordinary progress of the disease, in the first week of a fever as well as in the second week of the disease. He has seen in less than five hours after the exhibition of the medicine, the symptoms which take place in the ordinary crisis of a continued fever arise, and the fever has ceased in less than twelve hours.

This effect of these medicines the author has seen, in many cases, where there was no appearance that a crisis would have taken place in the fever, supposing that it had been left to pursue its ordinary course.

A crisis generally takes place, in a regular continued fever, in the night time; that is, from four to six, or eight o'clock in the morning; the author has seen it produced at other times of the day.

When

When these preparations of antimony have been exhibited, the author has seen fevers much more frequently carried off by crisis, than in proportion to the number of crises which happen in fevers left to pursue their ordinary course. He has seen these things happen in many hundred cases of fever; it may therefore be concluded, that these preparations of antimony, being exhibited in a fever, often produce symptoms similar to those which arise in the ordinary crisis of fever, or, in other words, a crisis similar to the ordinary crisis in fever, and carry off the disease.

The next question which occurs is, whether there is any other medicine which produces the same effects either more certainly, less certainly, or equally with the preparations of antimony which have been enumerated? It is matter of consideration whether this question should be first discussed, or whether it would be better to enter into the argument in what manner the preparations of antimony, hitherto described, should be employed,

employed, so as to have the best chance of carrying off the disease.

There are many reasons that might be urged for taking the one or the other argument into discussion first; but it is not worth while taking up time in discussing this; it is therefore the author's determination, upon the whole view of the subject, to pursue the best method of employing preparations of antimony to produce crisis in fever, though he is not sure that he is right, as he may be obliged, in many instances, to take notice of the effects of other medicines which have a similar action in fevers, and produce a crisis in them.

The author has already said, that when a patient is attacked with fever, it often happens that there is undigested food in the stomach, which will therefore require to be evacuated. From the fever itself, likewise, other noxious matter is probably produced in the stomach, in some degree similar to that which we find covering the tongue. It is
necessary

necessary to evacuate such undigested food, because by remaining it may contaminate the food that may be afterwards thrown into the stomach, by exciting in it the acetous, putrefactive, or other noxious fermentations, and prevent it from being converted into a substance which is afterwards to be formed into chyle.

Vomiting in itself has a tendency, after the sickness which produced it is over, to occasion a glow or warmth over the whole body, followed by moisture on the skin, softness of it, an universal softness and relaxation of the whole muscles, a flow of fluids through the whole secretory vessels, a general tranquillity over the whole system, and a disposition to sleep.

Although vomiting induced by any means has this effect, in some degree, when the sickness occasioning it is gone off, yet it has not the same effect, in an equally powerful manner, when produced by any means whatever.

If

If vomiting be produced by tickling the throat, by introducing any solid substance into it, as a feather or the finger, or if by a cough the larynx be forced up into the throat, some sensible effect similar to what has been just described takes place. If preparations of antimony or ipecacuanha be exhibited so as to produce vomiting; when the sickness is gone off, the appearances of crisis, which have been above described, arise in a much greater degree.

Although therefore all emetics, when the sickness is gone off which occasions the vomiting, have a tendency to produce appearances similar to the appearances which take place in the crisis of fever, and therefore actually tend to produce crisis in fever, yet they do not all tend to produce crisis of fever equally: therefore it is better to choose such substances as emetics, which have the greatest tendency to produce critical symptoms after the vomiting is gone off, than such as have a less tendency to produce the appearances similar to those taking place in crisis, in order that the emetic may have
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a better chance to produce a crisis in the disease.

It is therefore better to employ preparations of antimony or ipecacuanha, as emetics, in the beginning of a fever, than warm water, infusion of camomile, white vitriol, squills, &c. which have no tendency to produce symptoms similar to those which take place in a crisis of fever, independent of the action of vomiting.

It is not always that any of the preparations of antimony known produce vomiting, when exhibited to a man either in health or in a fever. Sometimes tartarified antimony in the dose even of several grains, does not produce vomiting but purging, given either in health or to a patient affected with fever. It is wished, however, that we should be certain of producing vomiting to occasion the evacuation of any noxious matter, such as has been described, from the stomach.

Ipecacuanha, the root of a plant, which the jealous government of Spain has prevented

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the perfect investigation of, is very certain in its operation as an emetic, much more so than any other substance which is at present known. It has besides the same kind of power which antimony has, though perhaps not in so great a degree, of producing those appearances which take place in the ordinary crisis of a fever. It is therefore better to mix ipecacuanha with tartarised antimony, and exhibit them so mixed as an emetic at the beginning of fevers.

The next point to be argued is, the dose of the medicine we are to employ as an emetic at the beginning of fevers.

When a medicine is to be exhibited as an emetic under one view, it does not appear to be of much consequence how large the dose is. Let the dose be ever so great, the first evacuation would seem to bring up every thing which is superfluous, so that the superfluous part of the dose should no longer act. This consideration explains why the very various doses of emetics which have been exhibited in various cases, produce.

produce very often nearly the same effect. Though this be the case in many instances, it is not in all. It happens also in many instances, that a large dose of an emetic produces most violent vomiting, which is repeated many times with great distress to the patient, so that it would seem that an emetic may lie so long upon the stomach, before it is brought up, as to make an impression, which lasts after the emetic itself is entirely evacuated.

In fevers the violence of the exertions, when an emetic thus continues to operate, perhaps six or eight times, in the first place exhausts the force of the system, which is not to be thrown away in this disease, and therefore on this account too large a dose of the emetic should be avoided.

Moreover, it has already been observed, that when any medicine is made to act in too great a degree, it loses its proper effect, and becomes a simple stimulant. So the action of vomiting itself, by being too frequently repeated, from exhibiting too large

a dose of the medicine, does not produce appearances similar to those which arise in the crisis of fever, so as to carry off the disease. For this reason ipecacuanha and antimony do not produce these appearances, if given in too great a dose. Thus by giving too large a dose of these medicines as emetics, the effect of carrying off the fever either by the action of vomiting itself, or by the effects of the antimony and ipecacuanha, are frustrated.

The proper dose may be about eight grains of ipecacuanha, and one grain of tartarised antimony.

If an emetic of almost any kind, which takes up a very small volume, be exhibited, if there should be nothing in the stomach to be evacuated, there arises an effort to evacuation, or in other words a reaching, which is attended with a great deal more uneasiness and pain, than if there was a quantity of some substance in the stomach to be evacuated. This has induced practitioners to give, after an emetic has been exhibited,

exhibited, watery fluids to drink; so that there should be something to be evacuated; in order to take off the uneasiness and pain of the reaching.

At the beginning of a fever emetics, as we have just observed, are employed for two purposes: First, to evacuate from the stomach any undigested food which was contained in it when the fever took place, or thrown into it afterwards, or noxious matter formed in the stomach in consequence of the fever. In the second place, by the action of the vomiting, and of the medicines employed as emetics, joined together, to induce a crisis to the fever, so as to put an end to the disease.

For the first of these purposes, to wit, evacuating noxious matter from the stomach, if it were undigested food, two or three evacuations by vomiting are certainly sufficient, and especially if after the first evacuation a quantity of warm watery fluid be thrown into the stomach. If noxious matter be formed in the stomach itself in

consequence of the fever, and if that should be affixed to the stomach, as the crust is to the tongue, no force will ever separate it, and if it should not be so affixed, two or three evacuations will be sufficient to carry it off; so that if two or three fits of vomiting should take place, it is sufficient for all the purposes that are wished for from the vomiting, and will not prevent either the act of vomiting itself, or the effect of the medicines, which have been enumerated as proper to produce it, from bringing on the appearances which take place similar to those that arise in the ordinary crisis of fever.

It does not seem indifferent at what time of the day an emetic is employed, if we wish it to produce any other effect than simply to evacuate the noxious matter contained in the stomach in fever.

In the first place, the operation of vomiting, after it is over, tends to produce sleep. Mankind generally are disposed to sleep about nine, ten, or eleven in the evening. If then the disposition to produce sleep,
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brought on by the emetic, coincides with the ordinary time of the twenty-four hours in which there is a disposition to sleep, the two together will be more powerful in producing their effect, than either of them alone. The rest thus procured by this double disposition will be sounder and more refreshing, than it would have been from either of them simply, and will tend to restore and support the strength of the patient. Moreover, it has been observed, that sleep produces a disposition for all derangements of the system to go off, and consequently fever; it therefore increases the chance of the action of the vomiting, and the power of the remedies employed to produce it, in occasioning the appearances which arise in the ordinary crisis of fever, and consequently in carrying it off.

Secondly, it has been observed, that the exacerbation of a regular continued fever takes place generally between five and six o'clock in the evening, and that the effort to a crisis made in the hot fit is

strongest about three or four o'clock in the morning. If the emetic be then exhibited between seven and eight o'clock in the evening, the disposition to crisis produced by the vomiting itself, by the action of the substances employed as emetics, by the sleep, and by the ordinary effort of the fever itself, will all co-operate together so as to have a better chance of producing a crisis in the disease,

It would therefore seem, when we employ an emetic in a fever, to evacuate any noxious matter from the stomach which has got into or formed in it by the means above described, that it is better to exhibit in a moderate dose such substances as emetics, which, if they are not exhibited in such doses as to produce sickness, have a tendency to produce symptoms similar to those which take place in the ordinary crisis of fever. It seems also necessary to prevent the violence of the reaching by introducing some watery fluid into the stomach, but that it is better not to employ the watery fluid in too great a quantity, nor re-
peat

peat it too frequently. It is likewise better to exhibit the emetic about seven or eight o'clock in the evening. Thus the action of the vomiting itself, of the medicines employed to produce it, the sleep, and the ordinary effort of the evening paroxysm of fever itself, will all co-operate together so as to tend to bring on a crisis, and so terminate the disease.

If any one should think the author is too minute in these attentions, he must consider that if, by omitting any of them, a crisis should not be produced when it otherwise might have been, the patient may be subjected for a fortnight, or longer in some instances, at least, to a distressing and dangerous disease.

It happens sometimes, when an emetic is employed, that with every precaution the sickness will continue, and the patient shall pass a restless and distressing night, more so than would probably happen if no emetic had been exhibited; but this must be left to be considered among the irregularities which
 happen

happen in the disease. Nevertheless, it is necessary to employ an emetic to clear the stomach of any noxious matter that may be left in it from the last food that was employed, or that may be generated in it in consequence of the disease, in as much as such noxious matter would occasion much greater disorder if it was not evacuated.

It happens not uncommonly that when a patient has taken an emetic, especially if regulated as is described above, he falls in less than an hour after its operation into a quiet sleep; a gentle easy perspiration takes place at first, and increases into a sweat more or less profuse; all the secretory vessels are relaxed, and the skin and the muscles also; a perfect crisis is produced, and the patient is freed from the disease.

It happens likewise not uncommonly, that though perfect crisis does not take place, the fever is considerably alleviated, and goes through its remaining course with less danger to the patient.

The

The author thinks, that if a practitioner be consulted in the beginning, that is, in the first four or five days, an emetic should always be exhibited in a regular continued fever.

Independent of vomiting, preparations of antimony, such as have been described, have the power of producing appearances similar to those that arise in the ordinary crisis of a regular continued fever. These preparations of antimony have been employed in two ways to produce such crisis.

First, if some one of the preparations above described be exhibited in a dose just not sufficient to produce sickness (when they have been exhibited empirically this has not been much attended to) in the evening about six o'clock; if the same dose be repeated about half an hour past eight, and again at eleven; if the patient be laid in flannel or cotton, or some other bad conductor of heat, his head bound round with a cloth of the same kind, and small quantities of some warm watery fluid, such as barley water, be given frequently, so as to throw the patient

tient into a profuse sweat if possible ; and this sweating be kept up by repeating the preparations of the antimony every four, five, or six hours, as the patient can bear it, without occasioning any sickness; and if this practice should be continued for four and twenty hours, it has happened, in many cases, that when the preparations of antimony, above described have been exhibited in this manner, a crisis has been produced, and the fever entirely carried off. This happens particularly if the remedy be exhibited in the first three or four days of the disease ; the crisis is thus very evidently the effect of the medicine. There is a degree of brilliancy in this practice which has made it be adopted by many practitioners who have a degree of empiricism.

It is to be observed, that such practitioners, and all empirics, have often exhibited antimony in this manner, or sometimes in one dose without repetition, at any time in fever, sometimes with success, but this will be considered afterwards.

The

The mode in which antimony appears to the author to have the best effect, with the least detrimental consequences, is, in the first place, to employ it as soon as possible in the disease; for it is more efficacious in the first attack of the fever, than in the second day of the disease, counting the days as has been before pointed out. It is more efficacious in the second day of the disease than in the third, and so on the third than in the fourth, &c.

It should be employed in the first place as an emetic, mixed with ipecacuanha, as has been already described. If the weather should be cold, it is better to lay the patient in cotton, and treat him as has been described, in the management of a regular continued fever left to pursue its natural course.

After having exhibited the emetic, as has already been described, when the vomiting has ceased, the patient being in bed, if he should continue sick and restless, as has been above described, which is sometimes

sometimes the case, about a grain of opium, or a dose of tincture of opium, equivalent to a grain, may be given without detriment, along with a little tincture of cinnamon or any other aromatic. This medicine should only be exhibited under the circumstances of the patient's continuing sick and restless, in which case it takes off the sickness, and suffers the antimony to act.

Six hours after the action of the emetic is over, if the patient should be awake, a dose of one of the preparations of antimony above described, should be exhibited in such quantity as the stomach can bear without sickness. If he should be asleep at this interval from the last action of the emetic, as soon as he awakes it should be given.

The author prefers tartarised antimony, prepared as is described above, in the last edition of the Pharmacopeia of the London College.

The dose of tartarised antimony the author would exhibit, in the first instance,
is

is two sevenths of a grain, or if the tartarised antimony be dissolved in wine, as is above described, in the *vinum antimonii tartarifati* of the Dispensatory, thirty drops of this solution dropped out of such a vial as is commonly made to contain two ounces in this country.

The author is sensible of the uncertainty of measuring any thing by drops. The quantity contained in a drop depends upon the viscosity of the fluid dropt. Four drops and an half of alcohol, for example, dropt from the same vessel, weigh only one drop of water, the alcohol being much less viscid than the water.

Again, the size of a drop depends upon the thickness of the lip of the vial from which it is dropt, or rather on that part of the lip from whence it is dropt. These difficulties may be easily obviated, by trying how many drops of any fluid dropt from one part of the lip of any one vial measures or weighs. If the vial be not above four-fifths full, the same number of drops, if they

they exceed twenty, will be found always nearly of the same measure and weight.

The author prefers this mode of determining the dose as the easiest and most readily measured.

It has this advantage, that if thirty drops of the *vinum antimonii tartarifati* should produce, on its first exhibition, any nausea, it may be diminished by four or five drops on the second exhibition. If upon this second exhibition it should produce no nausea, or if upon its first exhibition, in the quantity of thirty drops, no nausea should ensue, an additional quantity of two drops may be added to each dose, until the greatest quantity is found out that the stomach can bear without nausea. The author has already observed, that nausea prevents the medicine from having such a disposition to produce symptoms similar to those that arise during the crisis of fever, and so carry off the disease. The practitioner can therefore thus ascertain the exact dose which can be given without producing nausea.

If

If the author should be mistaken in thinking that tartarised antimony, prepared as has been described, is the best preparation of antimony for producing crisis in fever already known; or if some better preparation should be found out; yet as the stomachs of different men, or the stomach of the same man at different times, are differently impressed by the same doses of almost all medicines, he conceives that some mode should be taken similar to that which has been described above, to ascertain what quantity the stomach can bear of the preparation of antimony employed without nausea, and that it should be exhibited in that dose.

Along with the first dose of antimony to be exhibited in six hours after the last operation of the emetic, it may be proper to give a moderate quantity of some aromatic, so as to render it more agreeable to the stomach of the patient, such as infusion or distilled water of mint or cinnamon, or any other medicine of the same kind.

If the emetic exhibited should have produced a quiet gentle sleep, and the symptoms of a crisis appear; if the pulse has returned to the ordinary number of pulsations in a given time, and the patient should appear to be entirely freed from the fever; yet it will not be superfluous to repeat the preparation of antimony in the manner described, as no mischief whatever can arise from it, and it may secure the patient from the return of the disease.

After a dose of antimony is thus exhibited, it is to be repeated at four or five, or six hours interval.

The interval is to be determined from the effects which this dose has produced.

If the patient has had a crisis produced by the emetic, and a general freedom from the disease has taken place only with some languor, it will be sufficient to repeat it every six hours, and continue it for twenty-four hours.

If

If hardly any relaxation should have taken place in consequence of the emetic, but all the symptoms of fever, such as great depression of strength, weight about the precordia, pain in the forehead, dryness of the skin, &c. should remain in a great degree, it will then be proper to repeat it every four hours, and continue such repetition for four or five days.

If a preparation of antimony is given in this way at the beginning of fever, and continued for four or five days without producing a crisis, so that the fever is cured or converted into an intermittent, it rarely produces a crisis afterwards; nevertheless it often makes the relaxations greater, prevents or diminishes delirium, and makes the whole fever go on with less violent symptoms. It is better therefore to continue to exhibit such a dose of the preparation of antimony, as the stomach will bear without nausea, every six hours. When symptoms of weakness begin to appear, or if the antimony should produce sweating, purging, or any other topical evacuation, without relieving

lieving the fever, it is immediately to be omitted.

It happens, in many instances, that in the course of this time the patient has a moisture produced in the skin, a lateritious sediment takes place in the urine, the skin by degrees grows soft, the tongue begins to grow moist on the edges, and is cleared of the crust that forms upon it, all the other critical symptoms take place gradually, and the patient is freed from the disease.

If either the symptoms of the attack of the disease should be so violent as to give little hopes that the patient will recover, if the disease should pursue its ordinary course, or such an epidemic should be prevalent as destroys the greatest number of patients afflicted with the disease; in such cases, perhaps, it might not be improper to force a profuse sweat in the manner that has been described.

Unless however there should be little hopes of the patient's recovery if the disease should

should go on in its ordinary progress, such means of occasioning sweating ought by no means to be employed.

First, because sweating, though it be one of the appearances that take place in the ordinary crisis of fever, yet it is very far from being the only one; or, not only the secreting vessels of the skin are relaxed, and secrete a larger quantity than usual, but all the other secretory vessels are equally relaxed, and also the muscles and whatever other part is relaxed in the ordinary crisis of fever. We see also that profuse sweating takes place sometimes in a regular continued fever without any relief to the disease.

In the second place, every unnecessary evacuation tends to weaken the patient, and give him a less chance of being supported through the course of the disease if a crisis should not be produced.

Therefore it is not proper to attempt to produce profuse sweating, if there be any

tolerable chance of the patient's recovery, provided the disease should be left to pursue its ordinary course.

Hitherto the author has been supposing the patient to apply to a practitioner in the first day or two of the fever. In that case, provided the disease be a regular continued fever, by employing preparations of antimony in the manner described, symptoms similar to those which take place in the ordinary crisis of fever will be produced, as far as the author can judge from his experience, in one half, perhaps he thinks he can say certainly in one third of regular continued fevers.

If no medicine has been given during the first days of the disease, or if no emetic has been exhibited, it will be proper to employ an emetic in the manner which has been mentioned any time in the first week of the disease, or even on the eighth or ninth day, especially if there should be a greater foulness of the tongue, or more nausea than
in

in proportion to the other symptoms of the disease.

If an emetic should have been employed at the beginning of the disease, and the patient at any time afterwards during the course of it should have a greater foulness of the tongue, weight upon the stomach and nausea, than in proportion to the other appearances of the disease, it is proper to repeat the emetic. In this case, about five grains of ipecacuanha should only be given, which rarely fails of proving emetic. It should be exhibited in the evening, but the other regulations that have been laid down for the exhibition of an emetic at the beginning of the disease, are not necessary to be attended to.

If no preparation of antimony has been exhibited on the first two or three days of the fever, the exhibition of it afterwards will have less chance of carrying off the disease; for after the fever has continued for longer than three days, the system has acquired an habit which renders the disease

more fixed. Although the sooner the preparation of antimony is employed, the production of a crisis or gradual going off of the disease, by critical symptoms taking place after each other, is more probable, yet the fever in many instances will be carried off by the exhibition of it before the end of the second week of the disease. The sooner however it is exhibited, it will have the greater chance of removing the fever.

Although preparations of antimony should not produce a crisis so as entirely to carry off the fever, they produce a crisis in many cases, which though not quite perfect, yet converts the disease into an intermittent fever, which is a disease much easier managed than a continued fever.

Supposing preparations of antimony not to produce such a crisis as to convert a continued fever into an intermittent, or carry off the disease, yet it happens in many cases that they give great relief to the patient, so that the head-ach is diminished or entirely carried off, such a degree of delirium does
not

not take place as otherwise probably would have done, the primæ viæ are not so much disordered, and the fever pursues its course without so much distress and danger to the patient as it otherwise would have done.

It happens sometimes that there is great hardness, fulness, and strength of the pulse, as well as obstruction; that with these there is flushing of the face and redness of the eyes in the first two or three days of the fever, and that other symptoms of general inflammation take place in such a degree as to render it necessary to take away a quantity of blood; it then becomes a question whether preparations of antimony should be employed immediately at the beginning of such fever, before blood is taken away.

This is a case which happens much seldomer than would be suspected from what authors have written on this disease, and the argument will be entered into in that dissertation in which the irregularities that take place

place in continued fevers will be treated of.

If upon exhibiting preparations of antimony some one evacuation should take place, without a relaxation of the other secretory vessels, the antimony should not be persisted in. If profuse sweating should be produced, and at the same time the tongue should remain dry and covered with a fur, and the patient should remain costive and the other parts contracted: if a lateritious sediment should appear in the urine, or a flaky white sediment, the skin remaining dry and contracted, and the tongue dry and covered with a fur: if the patient should be purged, the skin remaining dry at the same time; in any of these cases there is little hope of antimony being of any kind of use if the system should continue in this state for forty-eight hours. It will rather tend to weaken and destroy the patient, and therefore ought not to be continued.

It

It is next to be considered whether there is any other medicine which has the same effect with preparations of antimony ; that is, whether there be any other medicine that will induce the appearances which take place in the ordinary crisis of fever, so as to carry off the disease.

In the history of medicine that we are able to collect from the Greek and Roman authors, whose writings have come down to us, there is one instance only of a medicine having had this effect, to wit ; when the physician of Alexander the Great exhibited to him a medicine, which is said to have occasioned the appearances which ordinarily take place in the crisis of fever, so as to carry off the disease in less than twenty-four hours. We have no trace of what this medicine might be, and it is singular that the same medicine should not have been exhibited to him again in that remittent, which he caught by surveying the marshes of the Euphrates, near Babylon, in order to have them drained.

Cold

Cold water was exhibited by Greek physicians, in fever, often evidently with a view of immediately putting an end to the fever. From the best information the author has been able to make out from perusing their writings, they exhibited it reduced nearly to the freezing temperature, in the quantity of from one to two quarts at once, so as to produce great evacuation by vomiting, purging, and sweating.

It was by no means the practice of the ancient Greek physicians, who were the principal and almost only practitioners in the Roman dominions, to give watery fluids, or indeed any thing to drink at the beginning or during the paroxysms of fever. In Petronius's satire, one of Trimalchio's guests says, that a man, whose funeral he had been at, was a very obedient patient to his physicians, for he did not suffer a drop of fluid to pass his lips for seven days, and he died notwithstanding.

It was not the practice of the Greek or Roman physicians to give cold water constantly

constantly to drink in small quantities, but in a large quantity at once, perhaps with a view of drowning out the heat, which they considered as the essence of the disease. It was to be drunk, as Celsus says, *ultra satietatem*. It is described however as bringing on those appearances which take place in the ordinary crisis of fever, and in certain cases as carrying off the disease.

This not having been the practice during the last period of forty years, the author has had no experience of giving large quantities of cold water at once for drink, and cannot therefore say what its effect may be. During this time it has been common, in consequence of Dr. Boerhaave's idea of rendering the fluids thinner in fever, to exhibit small quantities of warm watery fluids very frequently for that purpose.

That warm watery fluids, forced upon the patient often in fevers, is of no manner of use, the author is obliged to believe from repeated experience. It would be easy to shew that every reason, on which this
practice

practice was introduced, was perfectly without foundation, but as no knowledge whatever is to be gained by the discussion of this point, the author does not think it worth while to draw the reader's attention to the subject.

It was also a practice among some of the ancient physicians to employ the cold bath, in certain cases of fever, to produce a crisis, and sometimes the warm bath; but the history of both these practices is so little detailed in their writings, that the author has not been able to make out their effects, or whether they actually occasioned symptoms similar to those that take place in the crisis of fever, or whether they actually carried off the disease or no.

The author has had good information, that both in Italy and Spain drinking large quantities of cold water at once, as well as using the cold or warm bath, are still in practice in diseases called by them febrile, but he could never from their books, or from the conversation of the physicians of these countries

countries he has seen here, make out the idea they affix to febrile diseases, nor the actions of these remedies.

The author must therefore dismiss this subject, viz. the application of cold water, as nothing is known of it at present from any thing which can be considered as evidence. It requires half a century at least to destroy the bloom of novelty which deludes when a new medicine is recommended, or fix any evidence in medicine. It was a great deal longer before the bark of the cinchona was brought into general practice in intermittent fever. It was longer still before mercury was allowed by regular practitioners to be employed in medicine.

The next substance which has a tendency to produce those appearances which take place in the ordinary crisis of fever, is the root of ipecacuanha, an American plant, and which could not therefore be known to the ancient Greek and Roman physicians.

The

The root of this plant was first brought into practice as an emetic.

There is a tendency in mankind to employ almost every thing in medicine ; a tendency perhaps given them by the Almighty to supply that want of the knowledge of the ground on which medicines act, medicine being a science of so very great difficulty. Of the substances known in those countries with which Europeans were acquainted before the discovery of America, almost every thing had been tried and even celebrated in medicine. Dead men's bones, cobwebs and the rags that enveloped the bodies of the ancient Egyptians, as well as opium, colocynthida and squills. Whenever, therefore, new countries were discovered, and in consequence new plants, we constantly find practitioners in medicine using them in disease ; so the root of the ipecacuanha was found out to have an emetic quality, and was employed first as an emetic. Afterwards, when it came into Europe, its other effects began to be investigated, its action in rheumatism, in diarrhoea and dysentery,

in all which cases it seems to be analagous in its operation with preparations of antimony.

The present enquiry is to determine how far it is analogous to preparations of antimony in fever.

It has been already mentioned, that if it is wished to produce vomiting at the beginning of fever, it is better at least to mix ipecacuanha with preparations of antimony, it being surer of acting as an emetic.

If at any time, during the progress of the disease, there should be a considerable degree of sickness, especially if it should be attended with a thick brown fur upon the tongue, though an emetic has already been exhibited, it is useful to employ from five to ten grains of ipecacuanha to act as an emetic, as has been already observed. It not only throws off any noxious matter that may be in the stomach, but also produces moisture upon the skin; the sickness is relieved, and sometimes a complete crisis takes place, and the fever is carried off.

H

If

If a symptomatic purging should take place in fever, without any relief of the disease, if such purging should take place along with the fever, or soon after its beginning, as far as the author's experience goes, ipecacuanha is better used alone as an emetic. In this case it is also better to give such small doses of it as just not to produce sickness, every four or six hours. They have a better chance of carrying off the purging, and likewise of producing symptoms similar to those which arise in the ordinary crisis of fever, and so entirely carry off the disease, than preparations of antimony.

In all cases of fever, ipecacuanha seems to act much in the same manner as preparations of antimony, in producing symptoms similar to those produced by preparations of antimony, and in many instances carry off the disease, though not with the same certainty.

If we give ipecacuanha instead of preparations of antimony, the stomachs of most patients will bear a grain without occasioning

sioning sickness, and few stomachs will bear two grains without sickness.

In other respects the same attentions are to be paid when we employ ipecacuanha, as when we employ preparations of antimony.

Several of the neutral salts, such as kali vitriolatum, ammonia muriata, ammonia acetata, and some others, have been employed in fevers with a view of producing the symptoms which take place in the ordinary crisis of fever, in order to carry off the disease.

The author has seen moisture of the skin arise after exhibiting them, but he cannot say that in any one instance he could determine that they brought on a complete crisis in a regular continued fever. During the exhibition of these neutral salts, an ordinary crisis sometimes takes place, but not oftener than if they had not been exhibited, and therefore such crisis cannot be said to arise from their exhibition.

The author then upon the whole does not know of any remedy which has a tendency to produce a crisis in fever oftener than it would have taken place if no remedy whatever had been exhibited, whether such remedy has a tendency to produce vomiting or not, excepting preparations of antimony and ipecacuanha. Possibly it may be admitted, that the ancient Greek physicians for this purpose employed cold water internally, or the cold or warm bath, or some other remedy with which we are now totally unacquainted, with good effect.

Semicupium, or fomenting the lower extremities with warm water, is similar in some respects to the warm bath.

This practice has been used, especially when the patient is affected with delirium in the second week of the disease.

This practice is different from the warm bath, in as much as it can be employed without greatly disturbing the patient, and in
consequence

consequence without wearing him out by exertion.

When fomentation of the lower extremities is employed, it should be applied in the evening. The bottom of the bed clothes, under the patient's lower extremities, should be covered with some covering which will prevent them from being moistened, which may be taken away after the fomentation is no longer applied.

The fomentation should be performed by moistening flannel, or any thing which is a bad conductor of heat with water, heated to about an hundred degrees of Fahrenheit's thermometer. The flannel or other substance employed should be wrung out, so as to leave very little moisture in it; afterwards it is to be applied to the legs and feet until it begins to cool. As soon as the flannel begins to feel cool, it is to be removed, and fresh flannel is to be applied moistened with warm water. The time of cooling will be different according to the heat of the atmosphere at a medium about five minutes.

Fresh flannels are thus continually to be applied for about half an hour ; the covering of the under part of the bed clothes is then to be removed, and the upper part to be brought over the lower extremities of the patient, and he is afterwards to be left quiet.

It sometimes happens that a moderate sweat breaks forth, the patient falls asleep, and is considerably relieved. The author has seen in a few cases, but very few in proportion to those in which this practice has been employed, that a complete crisis has taken place, and the patient has been freed from the disease. In several cases the patient has slept, and the delirium has been considerably relieved. In the greater number of cases, however, no advantage whatever has arisen from the application, yet as it hardly tends to exhaust the patient, it is worth while to employ it.

Some, instead of moistening the flannel or other clothes with water, have employed mucilaginous substances dissolved in water,
such

such as decoction of marshmallow root, &c. and some have employed decoction of poppy heads. The author's practice has not ascertained that any advantage has been gained by the addition of either of these; in cases where there have been appearances of putrefaction, some have added a small proportion of vinegar. This addition seems, as far as the author can judge from the cases in which he has seen it employed, rather to have prevented the good effects of the application; but of this the author is not quite sure.

An inflammation of an exterior part of the body in many cases carry off diseases, which have arisen in other parts of the body.

Perhaps an inflammation of an interior part may also carry off diseases which have taken place in other parts of the body.

Fever is one of the diseases which is carried off by an inflammation of either an exterior or an interior part of the body.

H 4

It

It has been before observed, that an inflammation arising at the beginning of fever, particularly in the first paroxysms of the disease, not uncommonly carries off the fever altogether. It has been also observed, that inflammation often produces very considerable affection of the whole system, which many practitioners, both ancient and modern, have called and considered as fever. One principal scope of these dissertations is to point out, that every affection of the system, in which there is frequency of the pulse, and an increased degree of heat, is by no means fever. Such affections of the system almost always depend upon a continuance of their cause. When their cause is removed, the general affection of the system goes off also, while the cause of a fever seldom hath any effect upon it after having made its first impression. If it is removed, the fever almost always goes on; if it remains, the fever is rarely affected by it, but goes on through the same ordinary progress as if the cause had been entirely removed.

Thus

Thus an inflammation of the pleura generally produces at the time hardness, fullness, strength, and regularity of the pulse, which however is much more frequent in the patient than in health. With this alteration of the pulse from its common state, there is an increased heat, both as to the sensation of the patient, the physician, and to the thermometer. There is a crust formed upon the tongue, sometimes white, more frequently of a yellowish hue; there is a pain in the internal part of the head, flushing in the face, and often delirium; there is less appetite, and there are other disorders in the system. If the inflammation of the pleura be cured, as it sometimes is, by one copious bleeding, that is by taking away from four and twenty to thirty ounces of blood from the arm, all these appearances subside in less than twenty-four hours, and the patient recovers his health, excepting that he is somewhat weakened: whereas, let a fever arise in consequence of exposure to cold or to infectious vapours, or almost any other cause of fever, the appearances continue and go through their

their ordinary course equally, whether the cold or infection continue to be applied or not.

The author has already observed, that it happens often in fever that inflammation takes place at the very beginning of the disease, in the first or second paroxysm, and that such inflammations immediately carries off the disease without any thing like the appearances which take place in the crisis of a fever, but that the fever simply ceases. If it be such an inflammation as produces no affection of the system, as external inflammations often do not, then the symptoms of the inflammation in the part affected with it only continue. If the inflammation be such as produces frequency of pulse, heat, and other general affections of the system, though it should arise from fever, if it arose from any other cause than fever, the frequency of the pulse, and other symptoms, will be the same as if it had not arisen from fever, and continue although the fever be cured, and subside when the inflammation is carried off by means which would not affect the fever. Thus suppose in the second day of fever a pleurisy should

should arise and cure the fever, although the fever be carried off, there remains frequency of the pulse, foulness and dryness of the tongue, loss of appetite, great heat, urine remaining transparent when it has stood for several hours, &c. These appearances do not in the least constitute fever, but entirely depend on the pleurisy; and if the pleurisy be cured by bleeding, for example, all these appearances subside, although the bleeding would have had no effect on the fever, or carried off any of its symptoms, if the pleurisy had not first arisen, cured the fever, and produced these symptoms.

The knowledge that fever might be cured by exciting inflammation in some part of the body, may possibly be derived from physicians observing that a fever was actually cured in many instances, when an inflammation arose in some part of the body, even when no application, as far as the physicians could judge, was applied to excite that inflammation. The physician might think, therefore, that by applying something that would produce an inflammation in some part of the
body,

body, the disease might be carried off, and that an inflammation produced by any means might have the same effect with that which had arisen in the fever itself, without any apparent cause excepting the fever. He might therefore produce an inflammation in some part of the body by stimulating it with a view of carrying off the fever.

Perhaps rather that strong disposition in mankind not to wait the tracing of knowledge by experiment. might make physicians suppose, that the fever depended upon some noxious matter being diffused through the whole system, and that the application made might draw like a magnet that noxious matter into one part of the body, and produce an inflammation in that part instead of a fever in the whole.

It is still the opinion of many practitioners, that when an inflammation carries off a fever, if it be such an inflammation as tends to terminate in suppuration, the matter that occasions the fever in the whole system is accumulated in the inflamed part.

When

When the abscess is formed and breaks, and the pus is evacuated, many practitioners still believe that the matter which first produced the fever is evacuated. Other inflammations, such as arise in the skin for example, do not terminate in suppuration, but in a blister rising, that is the scarf-skin separates from the true skin, and contains in it principally the superfluous water and the neutral salts of the blood, sometimes along with a little serum, and sometimes also coagulable lymph, which coagulates and gives some degree of solidity to the matter contained in the blister. The scarf-skin afterwards breaks, and leaves the skin excoriated till a new scarf-skin is formed; until that happens a quantity of the superfluous water of the blood, together with the neutral salts, flow out. In this case it has been supposed that the fluids, or whatever other matter it might be that occasioned the fever, continues to be evacuated, and that so the fever is carried off.

The objections to this opinion are very strong: first, the author in his first dissertation upon this subject, has endeavoured
to

to ſhew that a fever is a diſeaſe of the living ſolids only, and that all the matter of the body, during the progreſs of many fevers, had exactly the ſame properties as if the patient were in perfect health.

In the ſecond place, ſuppoſing there was any matter exiſting in the body which occaſioned the fever, that matter muſt either be confined to ſome particular part of the body, or circulated in the blood veſſels, or be thrown out by the exhalants and taken up by the abſorbents, and ſo circulated. In the firſt caſe, if it was lodged in any particular part of the body, an inflammation in another part might excite the action of the abſorbents of the part where the noxious matter was lodged, ſo as to occaſion it to be taken up and carried into the general circulation. If they did not take it up, it would remain in the part where it was at firſt depoſited, and where it produced the fever, and ſo the inflammation which carried off the fever could not poſſibly occaſion matter to be brought to the inflamed part, as is evident to every perſon tolerably acquainted with the anatomy of the human body

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as it is now known. To bring the matter from a particular part where it produced the fever, into a part whose inflammation cured the fever, it is necessary that it should be absorbed, and carried into the general circulation. Supposing the matter to be absorbed and carried into the general circulation; or supposing it is originally blended with the whole fluids in circulation, so as to occasion the fever, the same argument will apply, and is as follows.

If any matter be in general circulation, it is mixed minutely with the whole blood. If it passes through the blood-vessels only, or if it passes also through the exhalant, into the cavities and absorbents, in both cases it is mixed with the whole blood returning from every part of the body, in the right auricle of the heart. The motion which takes place from the right auricle to the right ventricle, mixes it still more thoroughly with the whole blood. It is still more perfectly intermingled with the whole of the fluids in passing through the lungs, and again in the left auricle and left ventricle, so that it must be blended most perfectly, and most minutely in the aorta, so
intimately

intimately as to be equally distributed through all the vessels. It passes through them with such velocity that no difference of specific gravity can prevent its being equally distributed to every part of the body. If then there be no particular structure in any part of the body by which such matter may be caught, it will circulate equally through the whole body.

If there was any structure in any part of the body in its ordinary state, by which the matter of a fever could be caught, and would produce inflammation, then it would be the inflammation of that part only which would carry off fever. But the inflammation of any part of the body indiscriminately, in many instances, carries off fever, and therefore there must be a change in the structure of the part in which the inflammation arises, in order to account for the matter's being caught in that part, no such change has been shewn by any experiment, nor any cause of such change, so that we have an unknown thing, endeavoured to be accounted for by a thing equally
 3 unknown,

We must therefore simply conclude, that an inflammation arising in any part of the body without any apparent cause, excepting the fever itself, in many cases terminates the fever. How, or why this happens, is not as yet investigated; we are only led from this fact to enquire, whether inflammations excited by certain causes which produce that effect may not be employed to carry off a fever, as well as those which arise without any apparent cause.

The author has seen in several instances inflammation, produced by applying stimulants to a part of the body, when a patient is affected with fever, carry off the fever entirely in the space of twenty-four hours.

When an inflammation is excited in the exterior parts of the body, so as to carry off a fever, it does not produce appearances similar to those which take place in the ordinary crisis of fever; but the fever simply ceases, the head-ach goes off, the tongue becomes clean, depression of strength leaves the patient, all the evacuations come
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into their ordinary state as in health, the patient sleeps, and has his appetite restored.

Though an inflammation produced in any exterior part of the body now and then carries off fever entirely, yet it has but seldom this effect ; it only commonly alleviates the disease, or takes off some of the symptoms ; it sometimes carries off head-ach or diminishes it ; it diminishes, rarely carries off delirium entirely if it has arisen ; and so of the other appearances which take place in fever.

Since exciting an inflammation sometimes alleviates and carries off the symptoms of fever from particular parts of the body, if it should happen that one part of the body should be more affected in the fever than the other parts, an inflammation excited near that part is more apt to carry off the particular affection of that part, than one excited at a distance. If, for instance, there should be great pain in the forehead, an inflammation excited behind the ears is more

apt to carry off that pain, than if it had been excited in the back ; if there should be great affection of the breast, an inflammation excited in the skin of the breast will be more apt to relieve the breast, than if it had been excited in the extremities.

There are several substances which, when applied to the skin, will excite inflammation, viz. mustard seed bruised, horse-radish, and many other of the class tetradynamia of Linnæus ; many of the species of allium ; euphorbium, and other resinous substances ; as well as cantharides, ammonia, and many others. Of these modern practitioners have generally chosen to employ cantharides to excite inflammation in fever, sometimes mustard seed.

If cantharides be powdered, and mixed with an oily or watery substance, and applied to the skin, they excite an inflammation in the skin ; this is followed by a blister, in which the scarf-skin is raised from the true skin, so as to contain in it a watery fluid. When the scarf-skin is broke, this

fluid flows out, and the same kind of fluid continues to ooze out from the skin for some time afterwards.

Upon examining this fluid the author has found it to contain water, in which is dissolved natron muriatum, ammonia muriata, and ammonia phosphorata, with a little mucilaginous matter, sometimes serum. The fluid oozed out therefore contains the superfluous water, together with the neutral salts commonly contained in the blood-vessels and the putrescent mucilage. Nothing, therefore, which is not commonly contained in the blood-vessels of a man in health, is found in this fluid, but the superfluous water, neutral salts, or putrescent mucilage of the blood, were never known to occasion fever in a man in health. There is therefore no reason to suppose, that it is this particular fluid which occasioned the fever, or that this evacuation is of any consequence; it is not in sufficient quantity to weaken the patient. The whole effect, therefore, of the application of cantharides, in as far as they produce this evacuation, must be
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considered as of no consequence; it is the inflammation only which carries off the fever or its symptoms.

The juice of cantharides is often absorbed by the vessels of the skin, and carried into the general circulation of the blood, as is evident from its stimulating and occasioning inflammation of the neck of the bladder, when cantharides are applied to the skin, so as to inflame it.

Some have been of opinion that the juice of the cantharides so absorbed produced some effect upon the matter which occasioned and kept up the fever: such opinion, however, is not founded on any experiment. That there is any peculiar matter in the body keeping up a fever has not been shewn by any experiment, much less has it been shewn that the juice of the cantharides has any effect upon such matter. This opinion, therefore, resting upon nothing more than an idle dream, it cannot be made a foundation for any medical practice.

Many animal poisons absorbed, and carried into the system by their action on the irritable parts, occasion spasms or involuntary contractions of the moving parts of the body. The same effect is also now and then produced by the juice of cantharides, when it is absorbed and carried into the system. The author has, in several instances, seen *subfultus tendinum*, in women especially, and also more violent spasmodic affections, arise from the application of blisters in fever as well as in other diseases; the absorption, therefore, of the juice of cantharides, when it has this effect, so far from being useful, is evidently hurtful. But this does not happen often enough to prevent cantharides being used.

Cantharides are therefore better employed to excite inflammation with a view to carry off or alleviate fever, than other stimuli, as they most readily produce inflammation, the inflammation produced by them is carried off the easiest, and is more readily kept up if that should be wished; though sometimes the absorption of their juice produces

duces spasmodic affections, which occurs but rarely, and soon go off, if the cantharides are no longer applied, generally in less than twenty-four hours; though they are apt to produce strangury, which may be obviated or alleviated by employing mucilaginous medicines, such as gum arabic dissolved in barley water.

How these mucilaginous substances produce their effect, the author cannot satisfy himself, but that they do produce the effect in many cases is certain. The author has several times applied cantharides so as to excite inflammation to more than forty patients running. To the one half of them he has given mucilaginous substances dissolved in water, and in the other half has not; many fewer of those patients who took the mucilaginous substances were affected with strangury, than of those to whom the mucilaginous medicines were not exhibited.

Some have preferred the application of mustard seed, or some other of the class tetradynamia and genus allium, to

the feet and legs in cafes of delirium in fever.

This practice seems to have arisen from the doctrine of derivation, viz. to derive the matter as far from the head as possible, which is mere hypothesis. In practice it is found, that if any particular part of the body be afflicted with a disease, an inflammation produced in another part carries off the disease more certainly, if the inflammation is excited near the diseased part, than if excited at a distance. The proof of this, however, would be a digression too long to be entered into here, more especially as he believes it is generally acknowledged.

Suppose then that cantharides are preferred to excite inflammation in fever, the next question will be in what cafes such inflammation should be produced.

Supposing that a patient is seized with a regular continued fever, and that the practitioner had no other means of putting a stop to the disease excepting by exciting an inflammation ;

flammation ; or supposing that he has employed preparations of antimony or other medicines already enumerated, without being able to induce a crisis in the fever ; or even supposing that there were other means of inducing a crisis to the fever or carrying it off immediately without any critical symptoms ; and supposing the fever was perfectly regular and affected the whole system equally, in any of these cases it is often worth while to attempt to carry off or alleviate the fever, by exciting an inflammation, by means of cantharides in the skin between and over the scapulæ about six inches square. If the fever should be carried off by this means, the inflammation may be suffered to go off and the blister to heal.

The circumstances being the same, and the cantharides having been applied, and an inflammation produced, if the fever should not be carried off, nor in the least alleviated, the application of cantharides, or any other stimulant to produce inflammation a second time, rarely relieves the disease, and therefore it is not worth while to keep up or re-

new the inflammation of that part or any other part of the body ; it will only wear out the system, and give the patient a less chance of sustaining the ordinary course of the disease

Supposing the circumstances are the same, and the disease is alleviated, but not carried off, it may be adviseable to excite a new inflammation after the first is carried off. If this new inflammation should not carry off, or very much alleviate the whole disease, a third inflammation is not to be attempted. The constant stimulus kept up by the remedies employed to excite a third inflammation, and the inflammation itself, will wear out the patient so much, that no probable advantage arising from it can compensate for the mischief.

When a patient is going through the long progress of a fever, which takes up perhaps one and twenty days, or even longer, when no medicine has been tried or has been found capable of preventing it continuing its ordinary course, the practitioner,
and

and much more those about the patient, lose their patience, and the latter wish that the practitioner would exert himself, and do something efficacious. In this case, he is often compelled by those about the patient to apply cantharides to excite inflammation, notwithstanding the inflammation will probably be of no manner of use, but tend to wear out the patient. The relations and nurse, and by-standers, are satisfied with what they call a fine blister, and the practitioner's doing something. This certainly ought to be no inducement to a practitioner to torment the patient with an additional disease, or to wear him out by producing additional action, and so give him a less chance of going through the ordinary course of the disease.

It happens often that some part of the body is more affected in fever, than in proportion to the affection of the system generally. This forms an irregularity in fever; but not to have to recur to the excitement of inflammation again, the author means to notice it here.

Sometimes

Sometimes there is a much greater head-ach, that is, pain in the exterior part of the forehead, or all round the head, than in proportion to the febrile affection of the other parts of the system. In this case, at the very beginning of the disease, cantharides applied behind the ears, so as to excite inflammation, often relieves the head-ach, and sometimes carries off the whole fever. The sooner the inflammation is excited, the greater is its power, and therefore under such circumstances it is better to apply them so as to excite inflammation and occasion a blister, in the first two or three days of the fever.

Sometimes delirium arises earlier than we should expect from the other appearances of the disease. In this case, an inflammation produced by cantharides, so as to occasion a blister to arise on the head after removing the hair, or on the skin of the neck, or between the scapulæ, has sometimes considerable effect in diminishing, sometimes carries off the delirium, and even sometimes it carries off the whole disease.

Sometimes

Sometimes the breast is more affected than in proportion to the appearances of fever in other parts of the body ; there is for instance sometimes a greater weight and oppression about the precordia, than for the appearances of fever in the other parts of the body ; sometimes greater difficulty of respiration, attended with cough ; sometimes greater frequency of the pulse. In all these cases, when they arise from greater affection of the breast, exciting an inflammation in the skin over the sternum, has often given considerable relief, sometimes has carried off the whole fever.

It is to be remarked in all these cases of topical affection, that if the first inflammation excited, or blister produced, neither alleviates the appearances in the particular part of the body, nor diminishes the whole fever, a second or third inflammation, excited by cantharides or otherwise, has seldom any beneficial effect, but tends to irritate the whole system and wear out the patient, so as to render him unable to be supported through the remaining progress of the disease.

If

If the inflammation so excited should have given considerable relief, in that case keeping up the inflammation, or which is preferable, renewing it after it is gone off, is often useful.

In all cases where inflammation is excited either to carry off the fever totally, or to alleviate the symptoms when they have taken place in a greater proportion in one part than in the whole system, the sooner it is excited, the more it is likely to prove efficacious, excepting there should be great hardness, fulness, and strength of the pulse, and other appearances which would render evacuation by bleeding necessary, but this is rarely the case. The practice, however, has rather been to leave the excitement of inflammation till later in the disease, with a view perhaps to the practitioner's having something to do to satisfy the patient and bye-standers, rather than appear to allow the disease to go through its ordinary course.

It often happens that in the course of a regular continued fever delirium takes place.

This

This delirium has been described in the former part of this dissertation, as of two different kinds: the first, in which there is no appearance of affection of the brain, either when the patient is alive, or upon dissection: the second, in which, when the patient is alive, there is fulness of the vessels of the eye, flushing in the face, and on dissection the vessels of the brain are much fuller of blood than they are found to be in men killed by accidents, which have no effect upon the brain.

Both these species of delirium generally begin towards the end of the first week of the disease, but prevail principally in the second week. In the second species, taking away blood by opening the external jugular vein, and letting five or six ounces of blood flow out, has diminished the delirium considerably, sometimes has carried it off entirely, and with it the whole fever. The same effects have been produced by applying two, or three, or four leeches, and allowing them to fall off of themselves, and afterwards applying cloths moistened with
warm

warm water, and allowing the wounds to bleed for four or five hours. This last method is more efficacious. In such cases of delirium, therefore, it is proper to take away a small quantity of blood. The quantity of blood to be taken away should be according to the strength of the patient; if his strength be much diminished by the fever, or otherwise, the application of one leech to each temple is of considerable use.

Taking away blood from the arm, or any other part of the body distant from the head, is of no manner of use, as the author has seen in a great number of cases. It was much the practice about the year 1760, to take away blood from the arm in cases of delirium of both kinds, the practitioners believing that delirium arose from inflammation of the brain; but the author never saw any advantage arise from this practice.

In delirium of the first kind, where there does not appear any symptom of fulness of the vessels of the brain, the author has not seen any advantage gained by taking away
blood

blood in any way from the head, or from any other part of the body.

At the beginning of fever, it happens sometimes that very violent pain takes place in the forehead, which feels to the patient as if it affected the integuments of the cranium, and were merely external. In this case the author has seen three or four leeches applied to the temples give considerable relief to the patient by removing the pain, and sometimes they have carried off the whole fever.

The author cannot conceive in what way such evacuation from the vessels of the head should be of use, when taking away blood from a distant part of the body is of none. Every man versed in anatomy must know, that from whatever part of the body blood is taken, it is the same blood, excepting for the difference there is between arterial and venous blood, which are to be converted the one into the other in a few seconds.

The vessels of the exterior part of the head have very little connection with the

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vessels

vessels of the interior parts, so that taking away blood from the temples by means of leeches can have very little influence on the circulation of the interior parts. The reason why such topical evacuations by bleeding carry off or diminish the delirium or pain in the forehead, or even sometimes the whole fever, is wholly unknown to the author. The only thing that he knows with regard to it is, that it is often effectual, which was long ago taught to him, and which he has found confirmed by repeated experience.

In this case, as well as in the application of all the remedies employed to carry off or relieve fever, the effect is uncertain. Sometimes this topical evacuation is of very great advantage, or evidently carries off the fever without occasioning any of the appearances which take place in the ordinary crisis of the disease, and not unfrequently it has no effect at all. As so small an evacuation can hardly be of any disadvantage to the patient, it is worth while to employ it in the cases which have been enumerated.

The

The most conspicuous appearance, which takes place in the crisis of fever, is profuse sweating. Whatever substances, therefore, tend to produce profuse sweating suggest themselves as remedies proper for carrying off the disease. Spices are among the substances which tend to occasion profuse sweating, and have therefore been conceived to be proper remedies for carrying off the disease.

The great depression of strength, and great sense of coldness, which take place at the attack of fever, and when the coldness is gone off the great depression of strength which continues, suggest the propriety of employing such powerful stimulants as pepper, cinnamon, nutmegs, capsicum, &c. to prevent the patient from sinking under the disease.

The impression made by the appearance of weakness in the patient, and by seeing the fever carried off by a crisis in which profuse sweating takes place, has determined all nations in the beginning of medicine

to employ such powerful stimulants as the spices enumerated, or the most powerful they could procure, to produce a crisis; practitioners have also employed them to support the strength of the patient. It is not till medicine has subsisted for a long time in any country which has had no communication with others, or until the practice of other nations who have had much longer experience in medicine has been communicated to them, that such stimulants have been thrown aside, or the cool regimen, as it has been called, has come into practice.

It is moreover to be observed, that many practitioners in medicine have been nearly or totally without that education, which could teach them the knowledge of the experience of those practitioners who went before them, and in consequence on what ground the practice of medicine is founded. Unfortunately, in all the schools of medicine, the professors have been more anxious to infuse into the minds of their pupils some hypothesis, rather than a true history of the diseases

diseases they have treated of, or the efficacy of the remedies which have been employed.

It is not therefore at all to be wondered at, that the application of spices, and other powerful stimulants, should often be re-introduced. The same depression of strength, which originally brought spices and other such stimulants into practice, and the profuse sweating which takes place in the crisis of the disease, have made untaught and unexperienced practitioners fall into the same train of thought, and the same practice that prevailed in the rude state of medicine, that is, to keep up the force of the patient, or to bring on sweating, supposing by that means to occasion a crisis in the fever. This is called the warm regimen, and has been thus brought forward repeatedly.

For the same purpose the patient has been kept in an air of a very warm temperature, and covered with bed-clothes that are bad conductors of heat, and with the same effect.

It has been already shewn, that stimulating the body when there is depression of strength, but not actual weakness, is a means of exhausting the powers of the system instead of increasing them. It remains to be enquired whether sweating, produced by simple stimulants, or keeping the patient in a warm atmosphere, or loaded with clothes, will produce a crisis or carry off the disease.

Sweating alone does certainly not carry off a regular continued fever. Every practitioner, who has seen a moderate number of patients afflicted with regular continued fevers, must have observed sweating frequently take place without carrying off, or even producing the smallest alleviation of the disease.

In the crisis of fever, there is not sweating alone, but a universal increase of the secretions. The tongue becomes moist, the crust covering it is exfoliated; a laxity takes place in the intestines, sometimes a considerable purging; the skin regains its
healthy

healthy appearance, and is no longer contracted upon the muscles; a relaxation every where takes place. None of these other appearances happen when sweating is produced by stimulants, or keeping the patient in a warm atmosphere, or covered with clothes, non-conductors of heat: on the contrary, the mouth becomes more parched and drier, and the thirst is increased; the intestinal canal is more constipated; the patient is far from being relieved from any part of the disease.

If therefore the attempt to carry off the disease by stimulating by means of the remedies enumerated, or keeping the patient hot, is viewed in any light, it is to be totally rejected.

It happens not uncommonly in the human body, that a muscle contracts without any volition in the man, or even against and contrary to his will, and when there is no apparent stimulus applied either to the part itself, or to any other part of the system. Although this contraction is often, in a

very great degree, yet the two ends of the muscle cannot be brought nearer each other, because it is counteracted: in this case the body of the muscle generally swells, and occasions pain to a violent degree. This contraction has been called spasm.

This kind of contraction takes place not only where there are evident muscular fibres of a red colour, but in all the other parts of the body which have a power of contraction similar to muscular contraction, and not at all depending on their elasticity. For example, the gastrocnemii muscles of the leg contract without any volition or against the volition, and without any stimulus being applied; the belly of the muscles swells, and is extremely painful; so in like manner the skin contracts upon the interior parts, and produces an uneasy or painful sensation without the patient's volition, and when no apparent stimulus is applied.

That there is some cause for such contraction taking place there can be no doubt, but it is a cause that is imperceptible.

Such

Such contractions are called spasm, properly and strictly speaking. Contractions which arise from stimuli, applied either to the part itself or to some other part of the body or from affections of the mind, have been called in a vague sense spasms likewise.

The contractions which, strictly speaking, are called spasms, sometimes last for a very short time, not above a minute or two, and then go off; sometimes they continue for a more considerable length of time, and produce affections of the system which have been fatal. The spasm of the muscles of the leg for instance, which is called the cramp, does not last above a minute or two; it goes off, leaving a degree of soreness behind. A spasm of the annular muscular fibres of the intestines continues for two or three days; it produces extreme pain in the part, and a more frequent contraction of the heart, and in consequence more frequent pulsation of the arteries, so that they often beat more than one hundred and twenty times in a minute. A great depression of strength in the whole system comes
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on, a loss of appetite, difficulty of respiration, and derangement of all the other functions of the system take place; sometimes the effects prove fatal in a few days, or even hours.

It has already been shewn, that in fever there is contraction of the parts which have muscular power generally, and that fever often arises from causes perfectly unknown. Here is, therefore, a contraction in certain points similar to what is called spasm; some practitioners have, therefore, considered fever as a spasmodic disease, and the whole of it as consisting entirely of a spasmodic contraction of all the parts of the body which have a power of muscular contraction totally independent of their elasticity.

It is to be remarked, however, that contractions of the various moving parts is but a part of the disease; there is, besides this contraction, a depression of the powers of the body. This arises even before there is any appearance of contraction, and in many cases it is by no means in proportion either
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to the degree or universality of the contraction. This depression continues in many instances when the contraction in many parts of the body is gone off. There is likewise a regularity in the attacks, hot fits, and crisis of the disease, not at all similar to what happens in those contractions which are called spasmodic, these being almost always vague and irregular.

There are certain remedies which, being applied to the stomach or skin, or some other parts of the body of a patient affected with spasmodic contractions, in many instances will immediately carry off the spasm. In a spasmodic contraction of the muscles of the calf of the leg, æther poured upon the skin of the leg will, in some cases, immediately carry off the contraction.

It is to be remarked with regard to these medicines, that they have something peculiar in taste and smell, which we have not sufficient words to express; indeed we have few words to express the sensations
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which we receive from the taste and smell. These sensations are at least, at first, what we call fetid to the smell; their particular odor has given a distinction to these remedies.

Those which we commonly call antispasmodic, are some plants of the natural class of ringent flowers, by Linnæus, called *didynamia gymnospermia*, such as *mentha pulegium*, &c. Some of the natural class of umbelliferous plants, which come under the *pentandria digynæa* of Linnæus, as *ferulla assafœtida*, &c. some plants which have compound flowers, most of which are contained in the *syngenesia* of Linnæus, as *matricaria*, &c.; some medicines, the product of chemical processes, such as *æther*, &c.; some found in animals, as *musk*, &c. Most of these have been used to take off spasmodic affections, and several of them have been used in fever, with a view of taking off fever immediately, or gradually diminishing the disease.

It has been already said, that æther and oleum vini, dissolved in alcohol, sometimes produce sleep, in which sleep a crisis of the fever now and then takes place, and the disease is entirely carried off; but this has been sufficiently treated of in the first part of this dissertation.

Resinous substances, such as galbanum, sagapenum, oppoponax, &c. have sometimes been made use of, but rather as laxatives, than with a view of carrying off the disease. Assafœtida, gum ammoniac, procured from the same class of umbelliferous plants, though they have been much employed as antispasmodics in other diseases, yet as far as has come to the knowledge of the author, they have not been made use of with a view of carrying off or diminishing fever.

Musk has been employed, in many cases, towards the end of a regular fever, where the strength has been much diminished, with a view however rather of stimulating and keeping up the strength of the patient, than

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as a medicine applicable to the carrying off or alleviating the fever itself: it certainly, as far as the author can judge from frequent experience, has been of little use in either supporting the strength or alleviating the disease.

Castor has been employed in many instances, but especially along with small doses of opium, as has been described in the former part of this dissertation. The author thinks he can say, from his experience, this has been done with very considerable advantage in assisting the opium in producing a degree of stupor and sleep, so as considerably to alleviate the disease.

Camphor, a very peculiar substance, produced by the crystallization of the essential oil of the *laurus camphorifera*, and found often in cavities formed by the cracking of the tree itself, has been very much used, particularly in the second and third weeks of a regular continued fever.

This substance has been so much and so universally employed by the very first practitioners

tioners in medicine, by those of the greatest skill as well as of reputation, that the author's practice can be put in no competition with their opinion. There are many things, however, that make him dubious of its efficacy, either in alleviating or carrying off the disease. In the first place, he has frequently employed and omitted it throughout the second and third weeks of a regular continued fever, in similar cases, without observing that the fever was more alleviated in the patients who made use of the camphor, than it was in those patients who did not make use of it.

In the second place, the dose which has been commonly employed in what is called the camphor mixture, cannot possibly amount to two grains, whereas the author has frequently exhibited to patients in regular continued fevers upwards of ten grains, and to patients in other diseases twenty, forty, and even sixty grains of camphor, without producing in most cases any sensible effect. Sometimes indeed when given in the quantity of thirty grains and upwards, it has occasioned a little giddiness and stupor,

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which

which however have soon gone off. He does not think, therefore, that in so small a dose it can be very efficacious.

Again, in a fever which is running on for two or three weeks, and in which no efficacious medicines have been employed with success, but the disease has gone on in its ordinary course, the flavour of camphor gives the appearance of the practitioner's doing something efficacious, or at least attempting to do something while he is regarding the progress of a fever pursuing its ordinary course. It is wearisome to the patient, as well as to the by-standers and to the practitioner, to conceive that no remedy having any efficacy can be exhibited. This, the author suspects, has been the cause that camphor has been exhibited; its flavour, however, often disagrees with the patient's stomach, and produces sickness or nausea that prevents him from using food of sufficient nourishment.

The author has all along considered a regular continued fever to be similar to a regular

gular intermittent, consisting of ephemeræ following after each other at certain periods of time. He has said that the difference between an ephemera and an intermittent is, that an ephemera consists of one attack of fever only, while a regular intermittent consists of several paroxysms of fever following after one another, one paroxysm going off entirely, before the next paroxysm begins to take place, and the patient appearing in the intervals of the paroxysms nearly or entirely in perfect health, as far as is sensible to the practitioner or the patient.

He has also said, that the bark of the cinchona being exhibited during the interval between the paroxysms of a regular intermittent, has a power of preventing a fresh paroxysm from making its appearance, so that the patient shall continue in perfect health. He has said also, that the difference between a regular intermittent and a regular continued fever is, that the paroxysms of the intermittent are terminated by crisis, but that in a continued fever a new accession takes place before the crisis of

the former paroxysm begins. If it be true then that a regular continued fever differs only from a regular intermittent in the paroxysm of the continued fever not having reached the period of a crisis before a new paroxysm takes place, it might be supposed that if a sufficient quantity of the bark of the cinchona was exhibited during a previous paroxysm of the fever, that it would prevent the next paroxysm from taking place, and give time for the present paroxysm to reach its crisis, or gradually subside.

This reasoning is so obvious, that many practitioners have given large doses of the bark of the cinchona with a view of preventing another paroxysm from taking place in a regular continued fever, and so carrying off the disease. Many practitioners have likewise exhibited it, without any other reason than that if the bark of the cinchona cures an intermittent fever, it ought also to cure a continued fever. Both these sets of practitioners have employed the bark of the cinchona in powder to the quantity of one, two, or three ounces in twenty-four

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four hours, and in several instances with success. The fever in this case sometimes has been carried off with an evident crisis, happening later than the crisis of the paroxysm in which it was given would have taken place, and the fever has not returned, or the symptoms have gradually disappeared in less than forty-eight hours, and the patient has been restored to health.

When a young practitioner has succeeded with any medicine in carrying off a disease once, he always expects to succeed; as Sydenham observes of himself when he employed the juice of the spina cervina in dropsy. In like manner, the exhibition of the bark of the cinchona having succeeded in some cases in carrying off a continued fever, these practitioners have been warm in their recommendation of it in all cases of the disease; after a little time, however, most of them have left off the practice, finding it far from succeeding always. If it had even succeeded sometimes, without any detriment to the patient, they would not have been prevented from employing it, especially

when they had committed themselves by testifying its efficacy in the strongest terms.

The author has seen many cases in which it has been employed in a regular continued fever, sometimes with success, but it has much oftener failed of success. Where it has failed, the relaxations which began to take place in the disease have been much diminished, the pulse has become more frequent in the morning, the head-ach more considerable, the skin drier, the tongue covered with a thicker fur, the costiveness greater, if the patient was not thrown into a purging, the oppression upon the precordia greater, and likewise the difficulty of respiration increased. On the following evening the head has also been much more affected, that is, the confusion and delirium have been much more considerable, and the patient altogether worse than he probably would have been if no remedy whatever had been exhibited, and there has been less chance of crisis in the fever, and it has been longer of being worn out.

In a regular continued fever, therefore, the bark of the cinchona seems to have a greater chance of doing mischief than good, if it be employed in large doses, so as to attempt to carry off the disease at once. In certain irregularities of continued fever, it may be adviseable to employ it with a view of preventing the subsequent attacks of the disease, or in smaller doses, so as to support the strength of the patient, but these considerations will be the subject of a future dissertation.

The author has now enumerated the several classes of medicines which have been employed to terminate a fever sooner than it would be terminated in its ordinary progress, or alleviate the disease, so that it shall go through its progress with less danger to the patient, by rendering the symptoms less violent, excepting some few which he hardly thinks worthy of notice. Small doses of cerussa acetata were employed by Gaubius, and other medicines have been recommended by other physicians, which have never, as far as the author

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knows,

knows, come into general practice in any country, or have been useful.

The author has now pointed out the appearances which take place at the beginning of a continued fever, shewn those that take place during the course of the disease, at what time, and how they take place, and how they continue until the disease destroys the patient, goes off by crisis, or wears itself gradually out. He has also endeavoured to point out what attentions are to be paid to the patient on leaving the disease to pursue its ordinary course. He has also endeavoured to shew those means which have been employed to shorten the disease, so as to restore the patient to his pristine health, without leaving it to terminate itself by a crisis, or wear itself out.

One thing, however, is still left. The author has said, that in a regular continued fever there is always depression of strength, and that depression of strength sometimes rises to such a degree as to occasion putrefaction of the fluids. This is certainly not the case in the greatest number of regular continued

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nued fevers, and does not happen perhaps once in an hundred cases of the disease in all its forms and varieties. The author, however, could not pass over this symptom in describing regular continued fever, because, according to his opinion, this appearance of putrefaction always depends upon depression of strength; he therefore has described the appearance of putrefaction, and shewn that if it did take place, it endangered the life of the patient in the manner which has already been pointed out.

As therefore symptoms of putrefaction have been described as taking place from depression of strength, a constant part of fever, and when this depression of strength takes place in such a degree as to produce putrefaction of the fluids, the putrefaction endangers the life of the patient, it is necessary to enquire what means may be employed to prevent or remove this symptom, or counteract it so as to preserve the life of the patient.

All animal solids and fluids, which are employed for any of the purposes of life,

consist of a solid substance combined with water. This solid substance the author has called by the generic term of animal mucilage; and this acceptation of the term mucilage has now, at least in this country, Great Britain, been almost generally adopted.

There are fluids contained in animals, which have either no mucilage in them, or such a small quantity, as to be in no proportion worth attending to, not in the quantity of an hundredth part of the whole. These, however, are all excrementitious fluids which are no longer useful, and which are in their way to be evacuated.

The mucilages which form the solids and fluids along with water, which are employed in the living body, have various properties.

Some combine with water so as to form solids, such as the mucilage of the membranes, fibres, and cartilages of the body; some combine with water so as to form fluids, such as the mucilage of the serum,
coagulable

coagulable lymph, bile, &c. ; some are perfectly colourless, insipid, and inodorous, such as the true skin, the serum, &c. ; some are coloured, such as the mucilage of the bile, which is yellow, and the mucilage of the red particles of the blood, which is red ; some have a taste, as the mucilage of the bile has a bitter taste. All these properties remain perfect while the different mucilages are performing their offices in a living body.

If any of these mucilages be taken out of the living body of an animal, and allowed to die instead of retaining the properties that they had while in the body and alive, in a short time these properties are by degrees altered and lost, and the matter of these mucilages acquires new properties totally different from those that they had during the time that they formed a part of the living body.

When either a solid or a fluid is taken out of a living body, there are several circumstances to which it is exposed which are different from those from which it was in
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when it was in the body of a living animal, besides that it can no longer now be considered as alive. It may then be owing to some of these circumstances in which the animal mucilage is placed, when out of the living body, independent of its losing its life, that such change in its properties may arise. It is therefore to be enquired, whether these changes which take place in the properties of an animal mucilage, when taken out of the body and deprived of life, arise from its being merely deprived of life, or from the other new circumstances into which it is put.

Certain animal mucilages, on being deprived of life, lose many of their properties which they had when they were alive, as soon as the life ceases in them. All the solid parts of an animal which are capable of contracting, so as to become shorter than they would be if they were not alive, are constantly contracted to a greater degree when alive, than they would contract from their elasticity. This contraction ceases when they are dead; they are always, therefore, longer in a dead body than in a living body, even when they retain all their chemical

mical properties ; (that is to say, the properties that distinguish them from any other species of matter) as well as their mechanical properties. This proposition admits, however, of some abatement ; a solid, capable of contraction when an animal is alive, and exerting that power of contraction so as to become shorter, requires a greater force to break it, than if it was not to exert its power of contraction ; for it contracts by its particles coming nearer one another in the direction in which it contracts, but it breaks by its particles going to a greater distance from each other in the same direction ; but particles cannot come nearer each other in one direction, and go to a greater distance from each other in the same direction in the same instant of time ; therefore the power which the particles exert in coming nearer each other, in consequence of being alive, will resist any power which endeavours to draw them to a distance from each other whatever it may be, or in other words, a living moving part, by its constant contraction depending upon life, will resist any mechanical power which attempts to break it.

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As thus the mechanical properties of a living solid differ in some respects from those of the same solid immediately upon its death, so likewise the chemical properties of living solids or fluids, considered as alive, or as acted upon by the living solids contained in them, differ from the chemical properties that they have immediately upon their death. If a certain quantity of kali purum, a scruple for instance, be applied to any living solid in the body, it will unite with a certain quantity of the mucilage of the solids, and form a saponaceous substance, perhaps half a dram; if the same quantity of pure kali be applied to the same solid just when it has lost its life, it will unite with a much larger quantity, perhaps a drachm; it will therefore combine with a larger quantity in the dead than in the living body.

The mucilage of the coagulable lymph, contained in the blood-vessels, is either alive itself when so contained, or acted upon by the living blood-vessels, and is in consequence perfectly soluble in water; if it be
extravasated

extravasated into any cavity of the body, or if it be thrown from the blood-veffels out of the body, although in all other sensible circumstances it be in the fame fituation as it was in when it was contained in the blood-veffels, it becomes infoluble in water, fepa- rates from the water in which it was before diffolved and becomes folid, or, according to the ordinary term, coagulates.

It is not therefore ftrictly true, that the folids and fluids of a living body retain exactly the mechanical and chemical properties which they had when alive the infant they die. There are fome proceffes which do not go on in animal mucilages when alive, in whatever circumstances they are, which go on under the fame chemical circumstances when the fame animal mucilage is dead.

When an animal mucilage is alive, it continues fluid or foluble in water, or not foluble in water, fo as to form a fluid or a folid with the water with which it is combined, of an equal degree of foftnefs or firmnefs if it be a folid, and with an equal
degree

degree of adhesiveness or limpidness. If it be a fluid; it continues of the same colour, taste and smell. The moment that it dies, it loses those mechanical and chemical properties; a mucilage, therefore, is not acted upon by the same mechanical and chemical laws when alive, as when it is dead.

As soon as an animal mucilage dies, it becomes subject to various chemical changes, when put under certain circumstances, to which it was not subject when alive. One of these processes is known by the name of putrefaction. If a dead animal mucilage combined with water, so as to form a flexible solid, is placed in a heat between 45 and 150 degrees of Fahrenheit's thermometer, putrefaction begins to take place; this happens most readily in a heat of about an hundred degrees, if the mass be moderately exposed to the air of the atmosphere, and particularly that part of it which is called pure or respirable air.

The appearances which take place in a dead solid under these circumstances are, that
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the whole of it loses its firmness, that is, it is pulled to pieces with less external force; it feels more clammy to the touch, and if it be washed with water heated to about fifty or sixty degrees, a part of it dissolves in that water.

If it be the red particles of the blood, they become of a darker red colour after standing for some time, and upon examining them with a microscope, some of them appear broke into two, and look like half moons, and sometimes into several pieces like other sections of a sphere, and some appear still spherical, but of less diameter, and by degrees dissolve in the serum, giving it a reddish colour. They likewise redden the mucilage of the coagulable lymph. If the coagulable lymph be extravasated, or remains in the large vessels of animals after they are dead, it coagulates into a very firm substance, which by putrefaction becomes easier to break down, has a clammy feel, and part of it is rendered soluble in water, so as to form a fluid. The mucilage of the serum which, when it is taken out of the living

living body coagulates, if heated to one hundred and sixty-five degrees, into a firm solid mass, when it undergoes this process, if heated to that degree, it coagulates into a looser mass, and some of it not at all. Similar changes take place in the other mucilages of the body when putrefaction just begins.

In like manner, the other fluids of the body lose the properties which they had before putrefaction began.

If the putrefaction continues, the changes which take place do not happen in the whole matter which is to putrify at once. In the first stage, the whole of a solid fibre does not at once become soluble in water, so as to form a fluid, but part of it becomes soluble in water, and the other part remains without changing its properties in the least. In like manner, the whole of the red particles of the blood are not broke down into smaller particles, but some of them remain quite perfect, and have that form they had when taken from the animal in perfect health,
whatever

whatever that form may be, for their form has been disputed, and has not been agreed upon; in like manner part of the coagulable lymph coagulates perfectly, and another part of it does not coagulate upon extravasation. The serum likewise, in part, coagulates by heat as firmly as if no change has taken place in it, while another part does not coagulate at all. The mixture of the solid fibres, which are become soluble in water, with that part of them which has not changed so as to become soluble in water, being perfectly uniform, gives softness to the whole mass. Thus a portion of all these substances putrify at the beginning of the process, and another portion remains as perfect as it was before.

What has been above observed, is similar to what happens in all fermentations.

When a fermentation begins to take place, it does not take place in the whole mass at once, but in a certain part of it only, in which part a change instantly takes place; while in the other parts, no change whatever has

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happened,

happened. For example; if we have an hundred of the smallest integral parts of sugar dissolved in water, and place them in circumstances in which the vinous fermentation arises, at the first instant of the fermentation one of the particles of sugar is converted into wine, and the other ninety-nine particles remain sugar the same as before any fermentation took place; or, in the first instant of the fermentation, two or more of the particles of sugar may be converted into wine, while the remaining particles of sugar continue the same sugar they were before.

Supposing that the first of these suppositions should be the case, in the second instant of the fermentation, two of the particles of sugar will be converted into wine, and ninety-eight will remain perfectly in the form of sugar, and so by degrees the whole sugar will be converted into wine when the fermentation is finished, but during the progress of it there will be a certain quantity of sugar, and another quantity of pure wine.

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This is proved by taking the mass of mixture of sugar and wine, at any time during the progress of fermentation, distilling it until the whole alcohol is carried over. Afterwards separate the alcohol from the water so as to render it pure, and measure or weigh it. To the liquor remaining in the still, add a little quicklime, and mix a portion of whites of eggs; then expose the mass to a degree of heat sufficient to coagulate the whites of eggs; throw the whole through a filter; evaporate and crystallize; the sugar in it will be found the same sugar that was subjected to the fermentation, and its quantity will be in the inverse proportion of the alcohol obtained. If there be half the sugar, there will be a certain quantity of alcohol; if there be a quarter of the sugar, there will be half as much more of alcohol, as is well known to those who form vinous liquors for distillation.

It might happen that the whole of the mucilage which, with the water, constitutes

the coagulable lymph, might by putrefaction at once become soluble in water, so as to make a fluid solution; that the whole red particles of the blood might become soluble in the serum, so as to form a dark reddish fluid; that the whole of the mucilage of the serum might lose the property of becoming solid when exposed to a heat of an hundred and seventy degrees of Fahrenheit's thermometer, and yet no further change should take place.

It might happen in like manner, that the other mucilages of the body might only lose the properties that depended upon their solubility in water, and still retain their other qualities.

This, however, does not take place, if any dead substances continue to be exposed to the circumstances of putrefaction which have been enumerated, whether they were colourless, or of whatever colour they were in the healthy living body, they gradually assume a brown colour, which increases
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until it becomes of a shade so deep as to be conceived to be black.

In the progress of this process, substances begin to be extricated, which are vapours in the heat and pressure of the atmosphere.

One of these vapours has a fetid smell, very similar to the smell of a compound of inflammable air and sulphur. This smell has commonly been called a putrid smell, but experiments have not been made to determine whether it be actually a compound of inflammable air and sulphur or not, as far as has come to the knowledge of the author.

Another vapour extricated in this process is gas, whose synonyms have been already pointed out, viz. fixed air and carbonic acid; another vapour is pure inflammable air, which does not appear till the end of the process.

The mucilages are partly converted into these vapours, but at last there begins also to be found in the mass, if examined, nitrous acid and muriatic acid, combined with lime and ammonia, and towards the end of the process calcareous earth and ammonia, combined with gas.

All these things have been ascertained by experiment; it has been conjectured that clay is also produced.

Although the mucilages undergo these changes in the body of a dead animal, when kept in the same chemical circumstances in which they were in the body of a living animal, yet there are certain means of preventing them from going through the putrefactive fermentation after the death of the animal. In the first place, no such change will happen, if they be placed in such a degree of heat as will freeze the water contained in them; secondly, this change will not happen in the heat of two hundred and twelve degrees, or even in a heat somewhat below that degree, though that
degree

degree of heat in which putrefaction will not take place from the heat being too great, has not been exactly ascertained. In the third place, if no pure air whatever touches such animal mucilage, no putrefaction will occur in them. In the fourth place, although air should touch it, if a certain pressure is made upon it by condensing the vapours surrounding it to a very great degree, putrefaction will arise much more slowly, though it is not ascertained that there is a degree of pressure which will prevent putrefaction from arising altogether. Fifthly, if the whole water be separated from the mucilage by evaporation, no putrefaction will take place in it. Sixthly, if the water be separated from an animal mucilage by its coagulating in consequence losing its life, or if it be coagulated by heat, or by certain substances applied to it which have this effect, and if the water be afterwards squeezed out from it; when in any of these ways mucilage is separated from water, and rendered insoluble in water again, the more perfectly it is separated from the water with which it was

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combined, and the more perfectly it is rendered insoluble in water, the more difficultly the putrefaction will happen; and, if it be perfectly separated from the water, no putrefaction will take place. Seventhly, although a dead animal mucilage be kept in a heat in which it would putrify most readily, which is nearly that of the human body; if it be exposed to a proper quantity of pure air for putrefaction, as it is also in the human body; if the air in which it is contained is neither too rare or too dense to allow putrefaction to take place properly, as it is not in the human body; if it has a proper quantity of water contained in it; and if its water be not separated by evaporation or by tanning, neither of which happen in the human body without killing the part; if it should be in all these circumstances in which putrefaction takes place most readily in dead matter, yet if such animal mucilage should be kept immersed in an acid of any kind, or in an alkali, or in a metallic salt, or in gas, or in several other substances, it will not putrify. It is to be observed, however, that the quantity of these substances which
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are applied to it, to prevent it from putrefying under these circumstances, must bear a certain proportion to the whole of the mucilage, otherwise they will have no such effect. Let a drop of vitriolic acid be applied to an hundred weight of animal mucilage, and equally applied to all of it, putrefaction would certainly not be prevented. There must be then an adequate proportion of such antifermentative antiputrescent to produce any sensible effect; certainly sixty grains of concentrated vitriolic acid would have no effect on an hundred pounds of animal mucilage, whether solid or fluid.

Supposing then we could apply sixty grains of vitriolic acid to the human body, which commonly weighs one hundred and fifty pounds, in which all these circumstances of putrefaction are found, we could not expect any sensible effect to arise from it, whether the body be living or dead, and the same thing may be said of all antiputrescent substances.

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But sixty grains of concentrated vitriolic acid can never be applied to the living human body, excepting it be to the surface of the skin, or rather the scarf-skin; for five grains of concentrated vitriolic acid, and that diluted with water, are as much as can be thrown into the stomach at once, and this cannot be repeated more than six times in the twenty-four hours. The acid so thrown in will be destroyed by the bile and otherwise, and also be evacuated, so that we cannot expect thirty grains to exist in the blood-vessels at once, and certainly we can never get such a quantity into them as to be sensible to any experiment; we cannot therefore apply vitriolic acid, so as to prevent putrefaction in any perceptible degree. The same reasoning may be applied to any other antifermentative antiputrescent, such as any other acid, alkali, neutral salt, &c.

Vitriolic acid is among the most powerful substances for preventing putrefaction in proportion to its quantity. Peruvian bark is also capable of preventing putrefaction in dead animal matter, placed in circumstances

circumstances in which it would putrify; if the Peruvian bark was not applied to it. But while five drops of vitriolic acid may prevent a pound of dead animal matter from putrifying in a sensible degree, in circumstances in which it would otherwise putrify, it will require five hundred grains of Peruvian bark to have the same effect upon a pound of dead animal matter; now suppose that Peruvian bark gets into the blood-vessels, which is a question, it certainly never could get in in such a quantity as to produce a sensible effect on an hundred and fifty pounds of animal matter; therefore, taking it in this light, we could not expect to get into the blood-vessels such a quantity of any antifermentative antiputrescent, as to prevent the animal body from putrifying, if it were not prevented by the effects of life.

Since the mucilages of the body of a living man are in all the circumstances most proper for putrefaction, *i. e.* they are in the most proper heat, are exposed to be acted upon by a moderate quantity of pure air,
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are combined with a proper quantity of water, are in motion, remain often without change during a time they would putrify in, if they were in the same circumstances in a dead body, and have nothing in them which prevents them from putrifying when dead, it must be concluded that the life only prevents them from putrifying, or in other words, that it is as much a property of living matter not to putrify, as it is of dead matter to putrify. Since then nothing can be applied in such proportion to them as would prevent them from putrifying if dead, so nothing can be applied in such proportion as can prevent them from putrifying when alive.

Taking the argument in another view, it may be true that such a quantity of vitriolic acid, or any other antiputrescent anti-fermentative may not be able to get into the body, as to check putrefaction, yet the living power of the body, although diminished, would in some degree still prevent putrefaction from taking place. Anti-fermentative antiputrescents might supply

ply the loss of the living power, so that the remaining power of the life, together with the antiputrescent power of the antifermentative, might be sufficient to prevent any putrefaction. The very small quantity of the antifermentative that can be applied in proportion to the mass of matter that it has to work upon, makes it extremely improbable that it would, even taking the argument in this view, at all retard putrefaction.

A certain degree of putrefaction of the fluids, in a living and otherwise healthy body, may be brought on by a person's eating salted animal food with farinaceous matter. This degree of putrefaction is a disease which has been called sea scurvy, although it happens equally at sea or on shore, when such food is made the only nourishment. In this case, depression of strength is the first symptom of the disease, which arises evidently from food disposed to putrify, for if the patient lives on food not disposed to putrify for two or three weeks, the depression of strength, the appearances

pearances of putrefaction, and the whole disease are carried off.

In this case, neither vitriolic acid, nor Peruvian bark, nor any other antifermentative antiputrescent, has any effect in taking off the putrefaction, though they can be applied to the food in the stomach, and can therefore act upon it in a much larger proportion than they can do on any of the other solids or fluids of the body.

It is only native vegetable acid, and the looser vegetable substances, which we commonly call greens, which are capable of being digested themselves, and in their digestion rather tend to become acid than to putrify, that carry off the depression of strength, the appearances of putrefaction, and the whole disease.

When putrefaction of the fluids therefore arises solely from the depression of the powers of the body from using improper food, antifermentative antiputrescents have no power of the preventing putrefaction.

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We can therefore have little expectation of their preventing putrefaction arising from depression of strength taking place in fever; neither are vitriolic acid, Peruvian bark, &c. found actually to prevent putrefaction, when it arises from the depression of strength in a violent fever.

Moreover it has been conceived, that not only putrefaction might be prevented when it arose in the solids and fluids of the body, but likewise that the parts that had already undergone putrefaction to a certain degree, might be made to return again to that sound state from which they became putrid.

If animal solids putrify, the first appearances are, that they acquire an adhesiveness to other substances greater than they had before; they become of a greenish or brownish colour, and emit a fetid vapour, and are more soft and flabby. If they be taken in this state, and diluted vitriolic acid be applied to them, they lose their adhesiveness, become firmer, nearer their colour when
found,

found, and lose their smell. It has been thought in this case, that not only farther putrefaction was prevented, but that the part was re-changed, and brought back to the state it was in before the putrefaction began to take place.

On considering the argument, however, this by no means appears to happen. An acid decomposes the fetid vapour, so as to take off its fetor, but it does not re-convert the fetid vapour into the solid from whence it was produced; for if the fetid vapour be collected together after it is separated from the other parts, and an acid is applied to it, no animal solid is produced, though the smell of the fetid vapour is entirely lost.

That the destruction of the fetid vapour is a different process from the solids re-acquiring its firmness, is evident, because the solids may re-acquire their firmness without the fetor's being diminished, by applying an infusion of oak-bark to the matter that is become soft by putrefaction.

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The action of the infusion of oak bark is in this case upon the part that has not been changed by the putrefaction; that part it coagulates as it always would have done; but upon that part which has already been changed by the putrefaction, it has no effect.

For not only fermentation, but also solution and other chemical processes, do not take place in every particle of the mass that is acted upon, at the same instant, but progressively; that is, first upon one part of the mass, in that part the properties are totally changed; the properties of the remaining part continuing perfectly the same.

Thus, if a piece of lime be thrown into a vessel containing muriatic acid, as soon as it is thrown in, a part of the muriatic acid combines with a part of the lime, and forms a compound, viz. calx muriata, whose properties are perfectly different from the properties of the muriatic acid, or the properties of the lime, the remaining muriatic acid and the remaining lime retaining each its own

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properties,

properties, such as they were before they were thrown into the same vessel; there are therefore, after the first instant of the operation in the whole mass, lime, muriatic acid, and calx muriata.

Again, suppose ferrum vitriolatum, a compound of calx of iron and vitriolic acid, be put into a retort, and a receiver be adapted to it, and the retort be heated to a certain degree, the heat separates the vitriolic acid from the calx of iron, but not at once: at the beginning of the operation, a part of the vitriolic acid distills over, a part of the calx of iron remains behind in the retort, and along with it a part of the ferrum vitriolatum, not decomposed, but retaining the same properties it had before the operation.

So if a muscular fibre be placed in the circumstances in which it putrifies, the whole does not putrify at once, part putrifies, and is converted into a mucilage soluble in water, and not coagulable; and if the putrefaction go further into fetid vapour,
 &c.

&c. a part also remains coagulable by oak bark. Thus the oak bark renders the part that was unchanged much firmer by coagulating it, but is far from restoring the whole mass to what it was before. The coagulated or tanned part has not now the properties the muscular fibre had before it began to putrify, but is a substance with its properties totally different, excepting in its firmness; the fetid vapours, and other vapours remaining the same as if no oak bark had been applied.

In the cases, therefore, where oak bark, or any such substances have been applied to give firmness to animal substances which have become soft by putrefaction, that firmness arises from the coagulation of the parts yet unchanged by the putrefaction, and not from the parts, which have gone through any stage of putrefaction, returning to their former state so as to have their former properties, and so as to be useful for the purposes which they served in the body before the putrefaction had taken place.

When an acid or any other such substance coagulates, and renders firm a mass which is already putrified in part, it does not restore it to its former state. When it combines with or decomposes the fetid vapours, it does not unite with them so as to produce the substances that were changed into such fetid vapours by putrefaction, nor does it separate these substances from the putrid vapours so as to restore them to their pristine state.

Neither coagulating substances, therefore, nor substances destroying fetid vapours, restore putrid substances to what they were before.

Upon the whole, therefore, no expectation can be had of applying substances in fevers, where there is disposition to putrefaction, from putrifying, by any remedy that will either produce in them, or prevent any chemical process; much less can there be any expectation of restoring them to their former state, when they have actually putrified, by any such remedy.

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The only means, therefore, of preventing putrefaction in fever are: first, the carrying off the fever by the means already pointed out. When, therefore, symptoms of great depression of strength, such as great loss of muscular power, great oppression about the præcordia, sighing, a feel of softness in the pulse, &c. arise at the very beginning of a fever, a practitioner should be more anxious to produce a crisis by antimonial preparations, &c. Secondly, the avoiding all applications which diminish the force or depress the strength of the system. Evacuations therefore that are unnecessary, as bleeding, &c. should be carefully avoided; the patient should be kept quiet in bed, his mind as much at ease as possible, &c.

If any of the parts of the body have already putrified, the only way by which the putrid matter can be got rid of, is to suffer it to pass through the excretories of the body.

If with strong symptoms of putrefaction of the fluids, an hæmorrhage should take
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place

place either from the nostrils or mouth, or if blood be vomited up, or if it comes from the lungs, or if purging of blood should take place, or an hæmorrhage should happen from the womb, or if blood comes along with the urine, even if the hæmorrhage should be in small quantities, the patient is in the utmost danger. Should effusion of blood take place in any of these ways, without attending to any thing else, every means should be attempted to stop such hæmorrhage. The most powerful remedy for stopping hæmorrhage arising from laxity or putrefaction, is the bark of the cinchona, which should be given in powder to the quantity of an ounce in twenty-four hours, together with acids and other astringents. The following form, or something similar, may be exhibited:

R. Decoctum corticis cinchonæ libras duas cum semisse;

Rosæ rubræ exsiccatae unciam dimidiam;
Acidi vitriolici diluti drachmas quinque.

Decoctum fervens rosæ affunde in vase vitreo, dein adde acidum vitriolicum dilutum,

tum et macera, per horam dimidiam. Li-
quorem frige factum cola.

R. Colaturæ uncias duas;

Pulveris corticis cinchonæ drachmam
unam; misce fiat haustus quarta quæquæ hora
sumendus.

Although when hæmorrhage arises in con-
sequence of putrefaction, all other consid-
erations must give way to so dangerous an
accident; other hæmorrhages are not to alter
our other attentions during the fever. Some-
times an active hæmorrhage from the nostrils,
or another part, carries off the fever in the
same manner as an inflammation, although
the hæmorrhage be but in a small quantity.
If a large hæmorrhage should arise without
symptoms of putrefaction, whether it re-
lieves the fever or not, it may be prudent to
check it by infusion of roses, prepared ac-
cording to the London Pharmacopœia, given
to the quantity of two ounces every four
hours; but the bark of the cinchona is not
to be exhibited, unless it be proper from
other views in the disease.

The author comes now therefore to treat of the care of patients in a convalescent state, after a regular continued fever.

If a crisis should arise at the beginning of the first week of a regular continued fever, or before the sixth day, the disease most commonly returns, and becomes an inter-mittent.

The author must again take notice of the supposition, that there is some matter to be altered in the progress of a fever before it can be expelled from the system, which he has shewn is only supposition, and is unsupported by any experiment, no man having ever seen, smelt, or tasted such matter; it has however been often inculcated, that such matter must be subdued by allowing the inter-mittent to go on.

If however a crisis should take place in the first week of a regular continued fever, and if the crisis should be perfect or nearly so, if there should be considerable sweating, if the tongue should be clean or nearly so,
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if there should be a lateritious sediment in the urine, if the costiveness should be gone off, if the head-ach should have ceased altogether, or nearly, if the pulse should be less than eighty strokes in a minute, and tolerably free, the author is warranted from experience to say, that the bark of the cinchona should be given in powder immediately after the crisis, which is commonly about six or seven o'clock in the morning, to the quantity of a drachm every hour, and continued at least for forty-eight hours.

By this practice, it often happens that a return of any paroxysm is prevented, and the patient is freed from the disease.

If the crisis has arisen without the exhibition of any medicine, as the author has supposed in what is said above; if the crisis has been nearly complete, and the bark of the cinchona has been employed as has been represented, and notwithstanding this a fresh paroxysm of fever should return, the case must be referred to what has been said in
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treating of regular tertian intermittents, or will be said in treating of irregular intermittents in a future dissertation.

Supposing that preparations of antimony, ipecacuanha, or any other medicine which has the property of producing symptoms similar to those which arise in the ordinary crisis of a regular continued fever have been exhibited, and that they have actually produced these appearances which take place in such crisis, and there is a freedom from the symptoms of fever equal to that which has already been described, in this case the bark of the cinchona should also be employed as has been described.

Supposing that in the beginning of a regular continued fever there should be much greater pain in the forehead, or over the whole head externally, and that either by applying leeches to the temples; or otherwise making topical evacuations from the head by bleeding, or if in a similar case blisters have been applied in the first days of a fever behind the ears, or otherwise to any part of the head, and the pain has ceased, and all
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the other symptoms of the disease have gone off, although no mischief would undoubtedly arise from employing the bark of the cinchona, yet as far as the author's observation goes, the fever has not returned, though it was not employed.

If in a continued fever no medicine has been employed, and a crisis should take place in the first week of the disease, but that crisis should be very incomplete; that is, though about four or five o'clock in the morning the patient should fall into a sweat, even rather profuse, if there should be a lateritious sediment in the urine, but the head-ach should not be much abated, if the tongue should be still foul, if the depression of strength should remain very great, and the other appearances of fever should still remain without great abatement, it then becomes a question, whether the bark of the cinchona should be employed in large quantities, so as to try to prevent a return of a fresh paroxysm of the fever.

This argument, in the author's opinion, depends on the following circumstances:

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In the first place, this seldom happens in a regular continued fever in which the symptoms of the fever come on slightly at first. If it should, as far as the author's experience goes, it is best to employ the bark of the cinchona in the manner described, for though it often fails in preventing the recurrence of a fresh paroxysm of the disease, yet hardly any mischief arises from it. There is in this case a chance of terminating the fever immediately, so that the patient shall recover his health, for which reason it had better be employed.

In the second place, if a regular continued fever should attack a patient at once with violent symptoms, great sense of coldness followed by heat, returning alternately for twenty-four hours, or until the evening following, and if there should be great head-ach, great depression of strength, anxiety, &c. and no medicine has been exhibited which produces appearances similar to the ordinary crisis of fever; if an imperfect crisis should happen in the first week of the disease; in this case neither the bark of
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the cinchona, nor any other medicine acting in the same manner should be employed. If this should happen, it is proper to employ preparations of antimony, or other medicines of similar effect, in the manner that has been already described; when it is wished that they should exert their effects in the most powerful manner to carry off the remaining symptoms of the disease.

When the bark of the cinchona has been exhibited, sometimes no fresh attack of the fever has taken place, and the remaining symptoms of the first stage have gradually disappeared; but much more frequently the disease has returned; and continued as if no such imperfect crisis had happened, and the whole fever has been more severe, or the appearances which have remained have continued and gradually increased, and formed a new fever, which has lingered out for several weeks; or lastly the patient has been relieved from the fever, but continued in a languid and morbid state for a great length of time.

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This observation is one of the grounds on which the author has formed his opinion, that the bark of the cinchona prevents the return of fever, but does not take off a fever which is present. Preparations of antimony and other remedies having the same effects exhibited in such imperfect crisis in the first week of the disease, often remove the remaining appearances of fever, so that the patient is restored to health.

If, on exhibiting preparations of antimony or ipecacuanha, or any other medicine of the same class, a very imperfect crisis should be produced in the second week of a regular continued fever, the same method is to be pursued as if the crisis should take place when no remedy has been employed.

If no medicine has been employed tending to produce a crisis in a regular continued fever, and a crisis has taken place in the second week of the disease, if the crisis be tolerably perfect, that is, if a considerable sweating should take place in the morning,
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if there should be lateritious sediment in the urine, if the tongue should become tolerably clean, if some degree of head-ach should even remain, and the pulse should remain frequent even to ninety or an hundred strokes in a minute, and some other febrile symptoms should still continue, the bark of the cinchona should be employed in as large doses as the patient's stomach will bear. The fever is not near so apt to return, or be prolonged, as it is when such a crisis takes place in the first week, and therefore it is better to employ the cinchona, or other medicines of that class, than preparations of antimony, or other medicines which have similar effects.

The same thing is to be said if a crisis has been produced in a regular continued fever by means of preparations of antimony, &c. in the second week of the disease, or if the fever has been carried off in the second week by any other means.

If a crisis should take place on the fourteenth day, or any day afterwards, and the fever should be diminished by it, although
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not carried off, the appearances of the fever continue almost always to diminish until the disease goes off; it is therefore not necessary to employ any remedy with a view of preventing its return.

The great disposition in a fever to return, if a crisis should take place in the first week of the disease, the less disposition which it has to return if a crisis should take place in the second week of the disease, and the very little disposition which it has to return if a crisis takes place in the third week of the disease, most probably was the foundation of the idea which has prevailed from the earliest practitioners down to the present time, that there was some matter introduced into the body which required preparation or concoction; that is, that it should be in some way altered, in order to be evacuated before a fever could be got rid of. When, however, it comes to be considered that this, though it be a possible explanation of this appearance, is by no means supported by any other evidence, the author therefore does not think it worth while discussing this

this argument. It would be necessary for him to write a great many volumes to refute the various opinions, which have been admitted into the theory of medicine as true because they are possible.

If a crisis should take place at any time of a fever, purgatives have often been employed with a view of evacuating any part of the matter which occasioned the fever, that may have remained after the crisis had taken place. The author has already said, that there is no reason for supposing any such matter to exist; that it is mere hypothesis; purgatives, therefore, cannot prevent a fever from returning, or any mischief from happening by evacuating such matter. A purgative has no power of carrying off one fluid out of the blood-vessels more than another; it can only contribute, therefore, to the clearing the body of any particular substance, by occasioning a quicker change in the whole fluids. Purgatives would indeed evacuate all those which are at present in the body, so that a fresh set

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of fluids would be formed more quickly. The serum, coagulable lymph, and red blood, and all the healthy fluids, would be sooner re-produced from the food, if those which are now in the body are evacuated by purgatives as well as noxious matter, but it would be long before the change would take place, and the noxious matter got rid of. Supposing there was mixed with the whole blood some extraneous matter, which amounted to an hundredth part of the whole, and supposing that one dose of a purgative evacuated the hundredth part of the whole fluids, it would take more than fifty doses of purgatives to evacuate the half of the extraneous matter, for no experiment has hitherto shewn, that purgatives has any specific power of taking away one matter more than another.

It might be supposed that purgatives would evacuate the more fluid parts of the blood, and therefore would carry off the serum and superfluous water. If this was the case, after purging every day for several

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ral days, upon opening a vein, and taking away a quantity of blood, there would be less serum and a larger proportion of coagulum. The contrary of this, however, is found to be the case; there is actually less coagulum, and more serum and superfluous water.

It is commonly believed, when mercury has been exhibited, so as to produce salivation, that by exhibiting a purgative the mercury is carried off, and the salivation made to cease. The author chose forty patients as nearly similar to each other as could be, who had been cured of syphilis by mercury, exhibited so as to produce salivation, and in consequence the salivation was wished to be carried off. To twenty of these he exhibited purgatives, and to the other twenty no medicine whatever; in this case the salivation ceased much sooner, upon an average, in the twenty to whom no medicine whatever had been exhibited, than in the twenty who used purgatives.

It does not appear, therefore, that purging has any power of carrying off any nox-

ious matter remaining after a fever: first, because there is no evidence of such noxious matter existing; and secondly, if such noxious matter did actually exist, there is no power in a purgative to carry it off.

Moreover, purgatives have a considerable tendency to re-produce the disease, or occasion relapses, as the author has seen in many instances, and there are also several instances on record, though not related with that view. For instance, De Haen relates a case, where he says, that a fever returned, though there was a perfect crisis about the end of the second week, although purgatives had been exhibited; in that case, the purgatives evidently re-produced the fever. Purgatives are, therefore, never to be employed after the crisis of a fever, excepting there should be costiveness, and in that case only so as to produce one evacuation.

If a crisis should happen in the first or second week of a fever, the patient is never so much reduced in his strength as to require food of great nourishment. After such a crisis, it is much better to confine him for
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several days to such food as he employed during the fever, especially to avoid all solid animal food, more relapses having been observed by the author to arise from using solid animal food too soon, than from any other cause.

If a crisis should happen in the third week of a regular continued fever, although the patient be extremely weakened by the disease, yet no solid animal food is to be given; for it is to be observed, that the cause of the weakness, the exertions in the fever, have ceased. Very moderate nourishment in proportion to what mankind use commonly in cultivated countries, together with sleep, which in this case is generally easy and refreshing, is sufficient to recruit his strength. He should therefore for many days refrain from solid animal food, the use of which, the author has already observed, he has found more productive of relapses than any other cause whatever.

For the knowledge of the quantity of food which men use in civilized nations more than is necessary, the author begs leave to refer to his treatise on Digestion.

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If the patient is to avoid solid animal food when a perfect crisis takes place in the third week, although he has been much exhausted, it is much more to be avoided after a crisis has taken place in the first or second week, when the patient is not only less exhausted, but when there is likewise greater danger of a relapse.

If no crisis should take place in the first or second week of a regular continued fever, and if in the third week the fever should gradually diminish by critical symptoms taking place one after another; that is, if the tongue has been covered during the whole of the disease with a mucous crust, and that crust begins to leave the edges of the tongue, or exfoliates in small pieces all over the tongue, or if the tongue has had a raw appearance when moist, and a glassy one when dry, if it begins to be covered with its ordinary mucus, and is putting on its common appearance, if the pain in the forehead is gradually ceasing or entirely gone off, if there be a lateritious sediment in the urine for a day or two, which afterwards ceases, if the skin becomes gradually moist,

or

or a slight sweat should arise about four or five o'clock in the morning, if the costiveness should go off by degrees, or there should be some laxity in the intestines, if the pulse should become slow, or if it should fall at once to between eighty or ninety strokes in a minute, if the skin should return gradually to its ordinary colour, if these appearances of crisis should appear after one another, or in a slighter degree at first, and gradually becomes more conspicuous, the patient must be absolutely forbid the use of solid animal food for many days after the fever has begun to subside, or even of any food in too great a quantity, especially at once.

If a crisis should take place in the first or second week of a continued fever, and should be very perfect, the patient should not be confined to bed during the whole twenty-four hours, but should be covered with his ordinary clothing; but if the crisis be incomplete, and several of the symptoms of the first stage still remain, it is better that he should be confined to bed until these appearances go off.

If

If a complete crisis should take place in the third week of a regular continued fever, or if several critical symptoms should take place, it is better that the patient should be covered with his ordinary clothing, even supposing that he is obliged to lie upon the bed, excepting where the weakness is so very great, that he is apt to faint in being placed in an erect posture, or on any extraordinary exertion.

If the disease should begin gradually to diminish in the third week, when the diminution is become considerable, it is better also that the patient should be covered with his ordinary clothing during the day time.

The next dissertation will take notice of the irregularities and accidents which happen in intermitting and remitting fevers.

* PW
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